TITLE

The Effect of the Prospective Payment System on the Productivity of Short-Term General and Special Hospitals

by

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ABSTRACT

Until October 1, 1983, hospitals were reimbursed by a retrospective payment system. This cost-based reimbursement provided no incentives for the hospital industry to operate in a productive or efficient manner. As a result, hospitalization costs soared and exceeded overall yearly inflation by as much as three times. On October 1, 1983, the Federal Government instituted a Prospective Payment System for hospital reimbursement for Medicare patients. Hospitals received a fixed payment based on the patient's diagnosis. Diagnostic Related Groups combined all diagnoses that utilized similar medical resources and the fixed payment was based on that resource utilization. The Prospective Payment System with Diagnostic Related Group reimbursement was designed to decrease the accelerating cost of hospitalization and to force the hospital industry to become more productive and efficient in providing patient care. This study compares hospital productivity in the years prior to and after the implementation of the Prospective Payment System to determine what changes have occurred as a result of the new reimbursement policy.

INTRODUCTION

The productivity and efficiency levels of the hospital industry have been under attack for a number of years. Wide variations have existed across communities in lengths of stay by diagnosis and in the use of hospital personnel.[1] The purpose of this paper is to determine what effect, if any, the Prospective Payment System, introduced by the Federal Government for Medicare patients on October 1, 1983, has had on hospital productivity. Productivity measurements will be developed and comparing the productivity (and efficiency) levels of each year from 1965, when Medicare was first introduced, through 1988 will demonstrate how the hospital industry has responded to a fixed reimbursement payment system.

Prior to October 1, 1983, The Federal Government, insurance intermediaries, and the general public had been increasingly concerned about the accelerating and spiraling of hospital costs and the ineffectiveness of the Retrospective Payment System (RPS) to contain them. Under this system, the hospitalization expenses that were paid by Third Party payers which included Blue Cross, Medicare, and Medicaid, were based on hospital costs and on the percentage of patients treated for each insurance group.[2] In 1982, as a result, at least in part, of the exploitation of the Restrospective Payment System, the inflation rate in the hospital sector was three times the overall national inflation rate. The hospital industry had an inflation rate of 12.6%

while overall inflation was 3.9%. In addition, health care's percentage of the Gross National Product in 1981 was 9.8% -- up from 6.0% in 1965.[3]

Therefore, on October 1, 1983 the Federal Government began phasing-in the Prospective Payment System (PPS) which incorporated Diagnostic Related Groups (DRGs) as a cost containment measure. Hospitals would now be reimbursed based on the patient's DRG which delineated anticipated resource usage and a predetermined payment for each patient treated. On October 1, 1989, a major Third Party Payer, Blue Cross, also began reimbursing hospitals under essentially the same Prospective Payment System. This new prospective payment system was implemented to create an incentive for hospitals to control costs, become more productive, and run more efficiently - the very things that the retrospective payment system had failed to do.

Before determining what effect the Prospective Payment System has had on hospital productivity, let's first review how the Retrospective Payment System came into existence and then how both the Retrospective Payment System and Prospective Payment System reimbursed hospitals.

REFERENCES

1. Feldstein, Paul J., Health Care Economics, 3rd ed. John Whiley & Sons, New York: 1988, pp. 8-9.

2. _____, Annual Survey of Hospitals, 1986, American Hospital Association, 1988. Medicare = 37.9%; Medicaid = 10.9%; Third Party= 32.2%; Self-pay = 8.5%; Other = 10.4%. Flint: Medicare = 34.4%; Medicaid = 13.0%; Third Party = 42.2%; Self-pay = 3.7%; Other = 6.7%.

3. Schweiker, Richard S., Secretary, Dept. of Health and Human Services, Report to Congress on Hospital Prospective Payment for Medicare, December, 1982; p: 1.

CHAPTER ONE: THE EVOLUTION OF THE RETROSPECTIVE PAYMENT SYSTEM

1875 to 1900

Prior to 1875, the general hospital as it is known today was non-existent. The destitute and the destitute ill who had no family to care for them were cared for in institutions known as poorhouses and almshouses. Illnesses were treated mainly in patients' homes and physicians' offices.[1]

After 1875, the modern hospital system began its infancy as the result of two specific medical-technical discoveries - antisepsis and anesthesia. Antisepsis greatly reduced the problem of infection due to surgery and anesthesia made surgery relatively painless. Thus, surgery, because most of it had to be performed in a hospital, became the medical specialty that initiated the growth of the modern hospital. Additionally, by the turn of the century, the volume of medical patients receiving treatment in the hospital setting also began to grow.[1]

As the health care industry grew, it needed more money and resources compared to other components that comprised the gross national product. New money was needed because of the tremendous increase in surgical procedures and to cover the capital financing of hospitals. The middle and upper classes were driving a demand for the surgical procedures that had been perfected "by trial and error on charity patients who were the sole source of 'clinical material'".[1] In 1875 the United States had few established hospitals. By 1900 there were 4,000 recognized general hospitals functioning.[1]

Voluntary community boards and church bodies established most of the original hospitals with capital funds being supplied by millionaires and multi-millionaire philanthropists. Operating funds came from private pay patients and public coffers. Physicians, particularly those who wanted to be surgeons, made arrangements with the hospitals to bring in their private pay patients who paid both the hospital's charges and the physician's fees. In return, because the hospital was providing the physicians with a free place in which to practice medicine, the physicians agreed to provide the destitute with free care. Thus, hospitals survived with approximately two-thirds of their income coming from fees paid by private patients and the remaining third from public funds, charities, and philanthropy (respectable deficits were not uncommon).[1]

1900 to 1930

By 1909, hospital care was becoming difficult to pay for. The American Medical Association (AMA) noted that a stratified health system was emerging where the poor received free care, the rich could afford to pay for it, but the cost of hospital care was getting out of the reach of the broad middle class.[2] Between 1916 and 1920, sixteen states in conjunction with the American Association for Labor Legislation (AALL) formulated and submitted to the Federal Legislature a model bill for compulsory health insurance. The bill was supported by "social reformers from the ranks of academic economists, social workers, sociologists and a few sympathetic physicians."[1] Even the AMA set up a study commission to investigate the problem of high costs of health services.[3]

However, nothing came of it because the middle class was not sufficiently aroused or organized. In fact, Samuel Gompers, head of the American Federation of Labor (AFL), was openly hostile due to his distrust of government. World War I was underway and the discovery that Bismarck had made health insurance compulsory for Germany in 1883 didn't help matters any. The AMA and drug companies went on the offensive with a major propaganda campaign and easily won because the proponents did not have a political base.[3,4]

For the next ten to fifteen years the demand for personal health services increased and the people of the United States bought it without the help of government or private insurance. During this time the health services infrastructure as we know it today began to take shape: university education for physicians and dentists as opposed to only an apprenticeship, hospital based schools of nursing, the emergence of allied medical personnel, voluntary hospitals, private pharmacies, etc.[1]

1930 to 1965

The Great Depression of the 1930s not only changed lifestyles and the consumption of goods and services, it directly influenced hospital admission rates as well as payments from private patients - both decreased.[1] Both hospitals and the middle class, as well as the poor, became financially hard pressed. This depressed economic time helped to spawn the birth of private health insurance:

> The 1930s saw the start of the hospital-sponsored prepayment plans, eventually known as Blue Cross. Although such plans would have undoubtedly come about without the Great Depression, their development was likely hastened by it. Hospital stays had become relatively costly and lent themselves to the application of the insurance principle. A relatively predictable number of people would incur hospital expenses. Concurrently and separately, because the hospitals and physicians

> services were two separate interests and enterprises, prepayment plans for physician services in the hospital, mainly surgery, began to appear in the latter 1930s as well. These plans were sponsored by state medical societies and later became known as Blue Shield plans. Again, surgical care, which was relatively costly, lent itself to the insurance principle. (1)

During the Depression the government continued to care for the health needs of the poor and eventually the states entered into a shared program with the Federal Government. While formulating the Social Security Act of 1935, health insurance was considered but not included because it was felt to be too controversial. Health care reformers pressed to include health insurance, but when this became known, "the AMA raised such a storm that it was not included in the bill that went to Congress."[1]

During the 1940s, and based on Blue Cross' and Blue Shield's experience, private insurance companies realized that hospital care and surgery were insurable and that their costs could be predicted through the use of actuary tables. (And that they could make a profit providing health care insurance!) During World War II the government decreed that health insurance benefits were not considered as an increase in wages. This amounted to an indirect public subsidy because the portion paid by employers was tax exempt as a business expense. Furthermore, because employers often required employees to sign up for health insurance benefits as a condition of employment, this form of compulsory health insurance as demanded by employers was acceptable, whereas it would have been an extremely controversial issue had the government required it of employers.[1]

By 1952 over one-half of the U.S. population was covered by some form of voluntary health insurance - mainly hospital care and physician

services in the hospital. Blue Cross and the government had established contractual arrangements with hospitals and paid the hospitals' costs of caring for their subscribers. They did not pay hospital charges. However, there were no such negotiations with insurance companies other than Blue Cross or the government and they as well as patients without insurance, paid what the hospital charged. (Physicians negotiated generous fee schedules with Blue Shield and did not negotiate at all with private insurance companies.) As a result, hospital admissions between the 1930s and 1960s increased from 90 per 1,000 population to 145. (The percentage of the population who saw a physician in one year increased from 39 to 65 percent.) The supply of physicians and hospital beds also increased but did not keep up with the demand.

Until 1965 the Retrospective Payment System continued to operate as described with few exceptions. Blue Cross and the government continued to reimburse hospitals their costs to care for their respective subscribers while private insurance companies and private pay patients paid actual hospital charges. There were, however, a couple of noteable accurances during this time period. First, in the 1940s Congress passed the Hospital Construction Act (commonly known as the Hill-Burton Act) which gave a one-time grant to both public and voluntary hospitals. The result was that the number of hospitals increased and existing hospitals began to expand their physical plants. Needless to say, Hill-Burton was strongly endorsed by the American Hospital Association, the American Medical Association, and labor organizations.

Second, the influence of Health Maintenance Organizations (HMO) began to be felt as Kaiser Permanente in the West and the Health Insurance Plan of Greater New York (HIP) came into existence. HMOs

represented a major change from the solo practice and fee-for-service type of medical delivery. They were group practice prepayment plans that employed a wide range of physicians who were paid a salary and provided a full spectrum of services. The medical community's initial opposition to HMOs was fierce but later subsided as HMOs seemed to attract only about 4% of the population.[1]

During this time national health insurance had been placed on the back burner. Its proponents, however, began to realize that the aged had become a burden on voluntary health insurance and the broad middle-income segment of the population. The AMA and the AHA had maintained strong opposition to national health insurance fearing government involvement in an essentially lucrative and private enterprise and the possible loss of the fee-for-service payment structure if government paid health care bills directly. Both organizations lobbied Congress unmercifully and mounted a public campaign against the "evils" of "socialized medicine." (The mood of the country was "anti-socialized anything" as the Cold War with Russia was escalating.) However, once Congress capitulated and maintained the fee-for-service structure similar to that of Blue Cross and Blue Shield and agreed to intermediaries paying the bills (usually Blue Cross and Blue Shield) the stage was set to include Medicare (health care for the aged) and Medicaid (health care for the poor - often referred to as Title XIV) in the Social Security Act of 1965.[1,3,5]

> Medicare was a federal program and Medicaid was a shared federal-state program, as they still are. Medicare took the costs of the care of the aged off the backs of voluntary health insurance and families with aged and ailing relatives. Medicaid assuaged the national conscience regarding the poor and eased the pressure on the shaky revenue structure of the states. The states, however, still had to raise more money to match the federal portion.

> By then, private and nonprofit insurace agencies were supplying 42 percent of the charges of day-to-day operations of the hospitals and 30 percent of physicians' services, and government was paying for 38 percent of the hospital charges and 6 percent of the physicians' services, mainly for surgery. The stage was set for a spectacular increase in both price and usage. There were no built-in controls on cost. The health services enterprise had become accustomed to being paid what it asked, and the funding sources did not demur because employees, employers, and Congress did not demur either. From 1950 to 1965, expenditures as a percent of gross national product rose from 4.6 to 5.9. Expenditures per capita for all services rose from $78 to $198 without accounting for inflation, which was quite moderate during that period. The private insurance agencies and the government teamed up, as it were, to assure a health service where cost would be of no consequence. (1)

1965 to 1983

In the late 1960s, government, employers, and labor unions, as well as insurance companies and prepayment agencies - the big buyers of services - began to be really concerned about the rising expenditures for health services. What was most alarming was the pace of the increase. Based on the consumer price index, health care costs were rising faster than the economy as a whole. In fact, hospital expenditures alone were rising at the alarming rate of 15 percent annually.[1] The buyers of services were interested in keeping insurance premiums and reimbursements low while the general public was concerned about reducing out-of-pocket expenses. Providers said the increase in expenditures was justified due to increased use and improved services. They also noted rising labor costs in a labor intensive industry. While there appeared to be general agreement that the level of expenditures was too high, no one seemed to acknowledge what was an appropriate level of expenditures.[1,5]

The past practice of simply paying what the providers asked began to be seriously questioned. There was an intense concern with how to manage the health service industry so that providers would know what they were selling and buyers would know what they were purchasing. The payment mechanism appeared to be the means to manage the system. "Three methods to do so were to emerge, largely in the following order: monitoring of physician decision making in hospitals, control of hospital beds, and control of hospital reimbursement rates."[1]

HMOs began to be viewed as not simply a means of saving money, although this was an acknowledged consideration, but as a means of providing high quality and comprehensive health services efficiently and conveniently. Both federal and state governments began to facilitate the expansion of HMOs despite considerable opposition from the existing medical community.

The Department of Health, Education, and Welfare (now the Department of Health and Human Services) began to fund scores of hospital planning councils that were established in major metropolitan areas and sponsored by local hospitals. The aim of these councils was to establish inter-hospital relationships and cooperation - and of course, to save money. Hospitals had used size and costly, sophisticated services in order to obtain prestige and attract physicians. This competition resulted in a gross duplication of expensive services and equipment. Hospitals in close proximity to one another provided open heart surgery, computed axial tomography (CAT) scanners, a wide variety of intensive services, etc., and almost all hospitals had maternity beds despite a declining birth rate. This duplication of services and equipment frequently caused individual

hospitals to have fully staffed but under-utilized units resulting in inefficient use of personnel, space, and equipment. Local hospital situations were the subject of inter-hospital discussions as the councils attempted to be an information clearinghouse - assuming that the hospitals would recognize their mutual self-interests and survival. There is, however, no evidence that these councils achieved a reduction in either the duplication of services or a stabilization of the number of beds. As long as hospitals continued to be reimbursed for their costs of operations there was no incentive to discontinue their prestigious efforts.[1]

The failure of these councils to achieve their stated goals of decreased resource utilization lead to the establishment of the Federal Comprehensive Health Planning (CHP) program. It was directed at hospital facility planning and incorporated many of the hospital planning councils as agents of the state. Concurrently, an additional federal endeavor, also through the states, was the Regional Medical Program (RMP). This program concerned itself with the delivery of costly services to patients with heart disease, strokes (CVAs), cancer, and related ailments attempting to relate physicians to medical schools and major medical centers. It was hoped that physicians would benefit from the latest knowledge about these diseases causing a better integration of physicians' services and more rapid referrals of patients. However, neither program came even close to accomplishing its goals.[1]

"In the meantime, [hospital] expenditures increased apace; the internal and external dynamics of this tremendous growth enterprise was indeed awesome."[1] The Federal Government established commissions to

study hospital effectiveness and medical care for the poor (Medicaid) but they disbanded in confusion and frustration. At best they were ambiguous toward planning and while distressed at the prospect of additional government intervention they were at a loss to suggest anything else.[6] However, the Medicaid report did suggest that one means of containing rising health expenditures was to create competition between delivery options,[1] such as HMOs and Perferred Provider Organizations (PPOs).

Despite the fear of the above mentioned commissions concerning additional government involvment in the hospital industry, the government did exactly that - become more involved. Numerous state legislatures began passing laws requiring the issuance of certificates of need (CON) before a hospital could increase its bed capacity, build a new hospital, or renovate an old one. In an obvious effort at controlling supply, CONs had to be approved by a state agency. The states also began to place a control on price as they passed legislation to regulate hospital rate setting.

The Social Security Act of 1965, which established Medicare and Medicaid, provided for a review of hospital utilization. Congress, in another attempt at containing costs, passed legislation requiring utilization review of hospital care. Professional Standards Review Organizations (PSROs), made up of physicians, were to review physician decision making on an areawide basis. "From the medical profession's viewpoint this was a radical step."[1] In 1974, Congress also passed the Health Planning Act (PL 93-641). It mandated the creation of more than 200 health planning areas to be administered by health service agencies (HSAs). The majority of the HSA's board of governors was to be

comprised of consumers. The function of the HSA was to review the "...appropriateness of hospital construction, distribution, renovation, and the purchasing policies of hospitals regarding expensive equipment. Further, [they] were to measure health needs in their areas in a master plan according to federal guidelines to be passed on to counterpart state and federal agencies for review and consideration."[1]

> Congressional intent was to place need determination and control of facility construction at the local level. Needs, as determined by health service agencies, would then be submitted to upper levels of state and federal government. Upper levels of government could then react in terms of their funds and priorities and work out compromises. Congress and perhaps even the bureaucracy were exceedingly chary of imposing a blueprint on the states and local areas, preferring to set up fairly loose guidelines for discussion. It was apparently Congress' intent to put a planning apparatus in place before the enactment of some form of nation health insurance so as to have a framework in which to implement such legislation and to have a handle on costs and the direction of development of the personal health services. Certificate of need and rate control, although state level functions, were in effect turned over to the health service agencies for decision. The state normally respects health service agencies' decisions, and both state and federal governments can withhold payment from hospitals that do not comply. Even so, the current planning apparatus does not seem to have a firm place in national political policy... The states, of course, may do as they please to continue supporting the health service agencies using state funds. (1)

As the 1970s drew to a close, government increased their support of HMOs in an yet another effort to contain the escalation of health care costs. HMOs attempt to monitor physician decision making and have fixed premiums for comprehensive services. They utilize hospital services less than the mainstream fee-for-service system and therefore tend to cost less.[1,7] Government encouraged, even mandated, that employers provide employed groups a choice of plans (the choice was to include HMOs if available in the area) with the hope that competition between

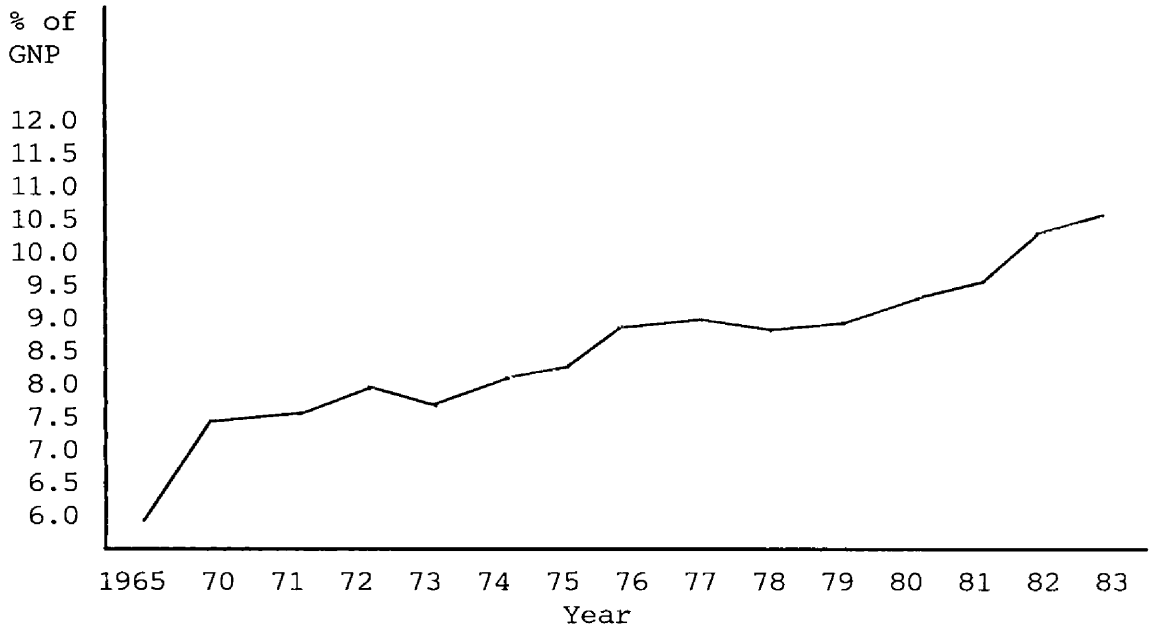
options would slow the rise in health care costs. Needless to say, the AMA, the AHA, and local medical societies strongly opposed this increased attention to HMOs and attempted to use local health service agencies to prevent the expansion of HMOs. Despite a considerable amount of propaganda, HMOs did expand and enter new marketplaces. However, through 1983 they attracted only 13.7 million people or about 6% of the population.[6,7]

Regardless of Professional Standards Review Organizations, certificates of need, rate review, and planning, the personal health services economy still grew, expenditures continued to rise, and attempts to manage the system did not have much effect. Between 1965 and 1983, the percent of the gross national product spent for all health services increased from 6.0% to 10.5% as depicted in Table 1-1 and Figure 1-1 below.

TABLE 1-1 - HEALTH CARE EXPENDITURES AS A PERCENT OF GNP
(in billions of dollars)

YEAR	GNP	HEALTH CARE EXPENDITURES	% GNP
1965	629.1	37.7	6.0
1970	992.7	75.0	7.5
1971	1,077.6	83.5	7.7
1972	1,185.9	94.0	7.9
1973	1,326.4	103.4	7.8
1974	1,434.2	116.1	8.1
1975	1,598.4	132.7	8.3
1976	1,718.0	150.8	8.8
1977	1,918.3	169.9	8.9
1978	2,163.9	189.7	8.8
1979	2,417.8	214.7	8.9
1980	2,732.0	248.1	9.1
1981	3,052.6	287.0	9.4
1982	3,166.0	323.6	10.2
1983	3,405.7	357.2	10.5

FIGURE 1-1 - HEALTH CARE EXPENDITURES AS A PERCENT OF GNP



Sources: Statistical Abstract of the United States, 1985, 105th ed. U.S. Department of Congress; Bureau of the Census, Washington, D.C.: 1985
Statistical Abstract of the United States, 1989, 109th ed. U.S. Department of Congress; Bureau of the Census, Washington, D.C.: 1989

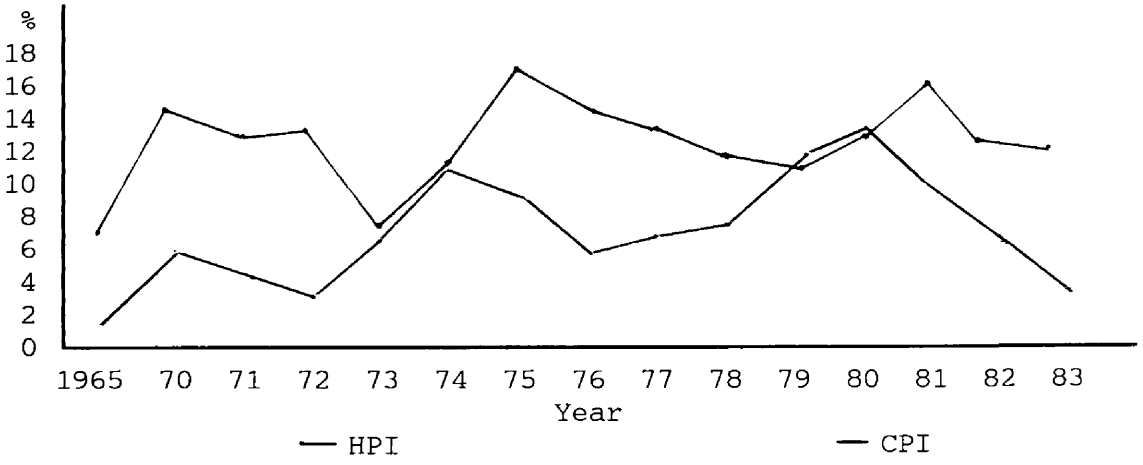
The payment concept that the American Hospital Association has favored in the design of payment systems for its member hospitals was the elimination of any incentive for hospitals to engage in price competition. When hospitals started Blue Cross. Blue Cross plans were required to offer their subscribers a service benefit plan. A service benefit plan provides the hospitalized patient with services rather than dollars, which is characteristic of an indemnity plan. By guaranteeing payment to the hospital for the services used by the patient, the service benefit policy removes any incentive the patient (or the hospital) may have regarding the cost of hospitalization. Since the patient does not have to make any out-of-pocket payments, the prospective patient has no disincentive to enter the most expensive hospital, which may or may not be the highest quality hospital. Under a

service benefit policy, hospitals cannot compete for patients on the basis of price. When Medicare was started, the method of Medicare reimbursement to hospitals (based on each hospital's cost plus 2 percent for capital improvements; capital improvements were a pass through with Blue Cross) also provided no incentive for patients to select less costly, more efficient hospitals.[7] Nor did it provide hospitals an incentive to contain costs or operate efficiently. This concept of hospital reimbursement resulted in the hospital price index running far ahead of the Consumer Price Index (CPI) as shown in Table 1-2 and Figure 1-2 below.

TABLE 1-2 - HOSPITAL PRICE INDEX vs. CONSUMER PRICE INDEX

YEAR	HPI	CPI	YEAR	HPI	CPI
1965	6.6	1.3	1976	14.4	5.8
1970	14.7	5.7	1977	13.8	6.5
1971	13.2	4.3	1978	11.9	7.6
1972	13.4	3.3	1979	11.3	11.5
1973	7.6	6.2	1980	13.3	13.5
1974	11.2	10.9	1981	16.2	10.2
1975	17.6	9.1	1982	13.1	6.0
			1983	12.7	3.0

FIGURE 1-2 - HOSPITAL PRICE INDEX vs. CONSUMER PRICE INDEX



Source: Feldstein, Paul J., Health Care Economics, 3rd ed. John Whiley & Sons, New York: 1988.

The second concept underlying hospitals' preferred method of payment was to engage in price discrimination, or in other words, to charge different prices to different payors. Hospitals can thus charge each payor based on their willingness or ability to pay. Charging Blue Cross for costs essentially gave Blue Cross a discount (often as high as 20%) over commercial carriers and private pay patients who paid charges. (Medicare and Medicaid patients were essentially a captive group). This discount gave Blue Cross a competitive edge and allowed them to offer a more expensive policy (a service benefit) and to increase their market share over the commercial carriers. (Although in recent years, their market share has declined from 49.1% in 1950 to 40.3% in 1985.)[7]

The Retrospective Payment System of hospital reimbursement, which provided no incentive for efficient and productive operations, had become unmanageable. Efforts to contain costs had not been successful. The Federal Government, insurance intermediaries, and private pay patients were all complaining, and vehemently so, about the high cost of health care and especially about the high cost of hospital care. The insurance companies had no formal plan on how to attack this dilemma. But the Federal Government did, and toward the end of 1983 introduced the Prospective Payment System (PPS) - which is the subject of the next chapter.

REFERENCES

1. Litman, Theodar J. and Robins, Leonard S., Health Politics and Policy. John Whiley & Sons, Inc., New York: 1984, pp. 59-80.

2. Corwin, E. A. L., The American Hospital. Commonwealth Fund, New York: 1946, pp. 9-26.

3. Anderson, Odin W., The Uneasy Equilibrium; Private and Public Financing of Health Services in the United States, 1875-1965. College and University Press, New Haven: 1968.

4. Committee on the Costs of Medical care, No. 28, The Final Report of the Committee on the Costs of Medical Care, adopted October 21, 1932. University of Chicago Press, Chicago: 1933.

5. Marmour, Theodore R. and Marmour Jan S., The Politics of Medicine. Routledge Kegan Paul, London: 1970, pp. 36-49.

6. Enthoven, Alain C., Health Plan: The Only Practical Solution to the Soaring Cost of Medical Care. Addison-Wesley Publishing Co; Reading, Mass.: 1980, pp. 12-22.

7. Feldstein, Paul J., Health Care Economics, 3rd ed. John Whiley & Sons, New York: 1988, pp. 67-77.

_____, Statistical Abstract of the United States, 1985, 105th ed. U.S. Department of Congress; Bureau of the Census, Washington, D.C.: 1985, pp. 96-111.

_____, Statistical Abstract of the United States, 1989, 109th ed. U.S. Department of Congress; Bureau of the Census, Washington, D.C.: 1989, pp. 92-109.

CHAPTER TWO: THE PROSPECTIVE PAYMENT SYSTEM

The Beginning of Change

As mentioned in chapter one, the Medicare program began by reimbursing hospitals on a cost-based formula.[1] This continued for seventeen years. The hospitals, using a lengthy and complex cost report, determined what the Medicare Retrospective Payment System owed them. The government reimbursed the hospital based on the proportion of Medicare patients it served. For example, if the hospital incurred allowable costs of $100 million and 36% of its patient volume were Medicare patients, then the hospital received $36 million form the government for the services it provided to these patients. (Although this formula is somewhat simplified, it is essentially how the Medicare RPS worked.)[1] Overall, the system provided hospitals with an incentive to expand their services and physical plants and no encouragement to manage productivity and/or costs. Much of the financial burden for excessive hospital spending was being assumed by the government. "Even Section 223, Limitation on Routine Costs, which had been in place since 1973, had only a minimal impact on reducing hospital spending or encouraging better cost and productivity management."[1]

> The effects of the cost-based reimbursement system have not been altogether bad. Since 1966, more improvements have been made in the United States' national health care system and in the health status of the elderly than in any other period in American history. The quality and size of the physical plant have improved and so have the scope and complexity of the services that hospitals offer. The large infusion of government cash into the health care system since 1966 has allowed unprecedented technical advances. Over time, however, as the level of hospital

> spending increased and the size of the aged population increased, the government's Medicare expenditures for health care also increased at too rapid a rate to be affordable. National health expenditures, which includes all public and private spending, increased from $43 billion in 1965 to $355 billion in 1983. (1)

The Federal Government was noticeably concerned about the high cost of health care and, as discussed earlier, had established commissions and panels to study the issue and make recommendations. However, no viable solutions to the Retrospective Payment System emerged. Expenditures for health care by Medicare alone increased from $5.6 billion in 1972 to $34.4 billion in 1983 - an increase of 515% in twelve years.[2] See Figure 2-1 below.

FIGURE 2-1 -- MEDICARE HEALTH CARE EXPENDITURES 1972 THROUGH 1983

Source: "Table 2, Discharges, average length of stay, days of care, total charges, and program payments for Medicare hospital beneficiaries receiving short-stay hospital inpatient services, by Medicare status of the beneficiary: Calendar years 1972-1983." Health Care Financing Administration; Baltimore, Maryland. Unpublished.

The early 1980s also witnessed a growing concern with respect to the national debt and the present and projected budget deficits (national defense, health care, etc.). There were those in government

who believed that if the rate of increase in government health care expenditures was not reduced, the Medicare trust fund could have a $300 billion deficit by 1995.[1] "The government recognized that changes had to be made, not only in the level of expenditures, but also in the incentives indigenous to a cost-based system."[1]

TEFRA

In 1982, Congress passed the Tax Equity and Fiscal Responsibility Act (TEFRA). One of the provisions of the act required the Department of Health and Human Services to develop a prospective reimbursement methodology by the end of that year.[3] This new methodology was to replace the retrospective, cost-based, payment system of Medicare payments and represented a profound adjustment to the hospital industry. The Medicare reimbursement system was being changed. The new system was designed to move the payment for hospital services from a system with inflationary incentives to a system with incentives for cost control and efficiency.

> The legislated prescription for slowing the rate of increase in Medicare hospital expenditures is economic in nature. The industry has not been able to voluntarily stem rapidly increasing hospital costs and total expenditures. Hospitals have been at the mercy of both demand-pull and cost-push inflationary forces, as well as an inflationary reimbursement system. Much of the demand for hospital services is highly in-elastic, that is, insensitive to changes in price. The problem has been further compounded by the fact that economic activity in the industry is not controlled by the classic forces of supply and demand. Hospital services are almost never purchased by an informed consumer. It is his agent, the physician, who decides which services will be purchased. Furthermore, the patient's financial risk is limited to the amount of his insurance deductible, which, for most hospital services, is minimal. The physician assumes no financial responsibility for the patient's consumption of hospital services. The reimbursement system assumes financial responsibility for the hospital

> services consumed, and has had little, if any, input into the decision of which resources will be purchased. (3)

At the same time that Congress passed TEFRA, it recognized that the transition from a retrospective payment system to a prospective one would be difficult for many, if not most, hospitals. Therefore, it also provided for paid incentives or penalties to hospitals if Medicare costs were less than, or in excess of, predetermined target rates of increase per admission during the transitional period.

With the TEFRA mandate, the Department of Health and Human Services predetermined fixed prices that were set prospectively for Medicare inpatient hospital services. The financial burden associated with poor labor productivity, excessive spending, or ineffective cost control was now on the hospital and the government would no longer be at risk for the spending levels of these institutions.

It is interesting to note that numerous authors who have written on the Medicare Prospective Payment System have all recognized that it is the physician, functioning as the patient's agent, who actually controls utilization levels of hospital services and, therefore, a significant level of hospital expenditures. However, Congress, with the enactment of TEFRA, placed the onus of controlling expenditures on the individual hospitals, thus requiring hospital administrators to hammer out the details of reducing costs with their medical staffs (most, if not all, of whom want the best and latest, not to mention expensive, technology) and thereby avoided attacking physicians directly for their over-utilization of the system.

DIAGNOSTIC RELATED GROUPS (DRGs)

The Medicare Prospective Payment System was built around a concept known as Diagnostic Related Groups or DRGs. Diagnostic Related Groups were initially developed by a team of Yale researchers, clinical consultants, and physicians under a grant from the Health Care Financing Administration (HCFA), a division of the Department of Health and Human Services. DRGs are a patient classification system based on patient attributes and treatment processes rather than on bed size, service capacity, or occupancy rate of a hospital or its medical staff.[1]

> DRGs transform a hospital from an entity perceived as a conglomeration of tests, rooms, and services to an entity that provides very special products. Those products, or DRGs, are treatments of heart attacks, broken bones, ulcers, respiratory problems and so on. Each of these hospital products and patient treatments has an assumed volume of resource utilization associated with it. Average resource use is assumed to be a function of the patient's age, sex, primary and secondary diagnosis, and discharge status. (1)

The researchers at Yale had developed a statistical method of grouping patients by diagnosis and utilization of hospital resources as early as 1975.[4] Initially, they defined 383 categories (DRGs) that were expanded to 467 in 1983 and to 473 by 1988. The concept of DRGs is built around the theory that patient treatments can be grouped into various product categories and comparing them with "statistically valid national averages, one can determine, within reasonable parameters, whether the resources used during a particular patient's stay were appropriate for that patient's specific condition."[1] Hundreds of thousands of cases were studied, analyzed, and grouped by the researchers in order to provide a basis for identifying and measuring DRGs in utilization review - which was the original purpose for their development.[5] The grouping criteria used in establishing the original

DRGs was redefined and reclassified numerous times with the aid of computer programs in order to group and classify patients with similar characteristics and minimize disparities and variances with groups.

> DRGs are defined by several characteristics. In addition to age and sex, the multiple diagnoses and procedures that a patient receives are translated in a hospital's medical records department into what are known as ICD-9-CM (International Classification of Diseases, 9th ed. Clinical Modifications) codes. There are over 12,000 numbered ICD-9-CM codes that correspond to the above characteristics. In addition, to determine DRG classification, the primary diagnosis of a patient is initially classified into one of 23 major diagnostic categories (MDCs). Clinically speaking, the human body is perceived as a system of 23 interlocking systems or MDCs, for example, the circulatory system, the nervous system, the muscular system, the skeletal system, etc. The MDC and ICD-9-CM codes ultimately define the DRG, which is most descriptive of the product the patient received from the hospital. (1)

Thus, diseases that tend to be diagnosed and treated in similar ways by similar specialists are aggregated in the same MDC regardless of etiology and each hospital discharge is assigned to one (and only one) MDC based on the patient's principal diagnosis code.[6]

With few exceptions, each MDC is then divided depending on whether or not the patient requires a procedure performed in the operating room. Discharges are referred to as **surgical hospitalizations** provided they have had an operating room procedure while those that require no operating room procedure are referred to as **medical hospitalizations.** Medical hospitalizations can then be assigned to clinically coherent groups of principal diagnoses and surgical hospitalizations into groups of operating room procedures referred to as procedure categories. These procedure categories are based on the intensity of resource consumption and are hierarchical in nature. In other words, a discharge who has multiple operating room procedures is assigned to the surgical group based on the most resource intensive procedure within the hierarchy.[6]

Depending on the MDC, diagnostic groups (corresponding to medical hospitalizations) and procedure categories (corresponding to surgical hospitalizations) may be further partitioned on the basis of age, the existence of comorbidities and complications, and in a few cases, discharge status. Some procedure categories are also partitioned on the basis of principal diagnosis. A compound variable, age 70cc, is used extensively throughout this system. This is a dichotomous (2 level) variable that takes on the value "yes" if age>=70 and/or there are substantial comorbidities or complications, but takes on the value "no" otherwise. Substantial complications and comorbidities are defined as those conditions that, in the judgement of the clinicians constructing the system, would be likely to increase the length of stay for 75 percent of the patients by at least one day.

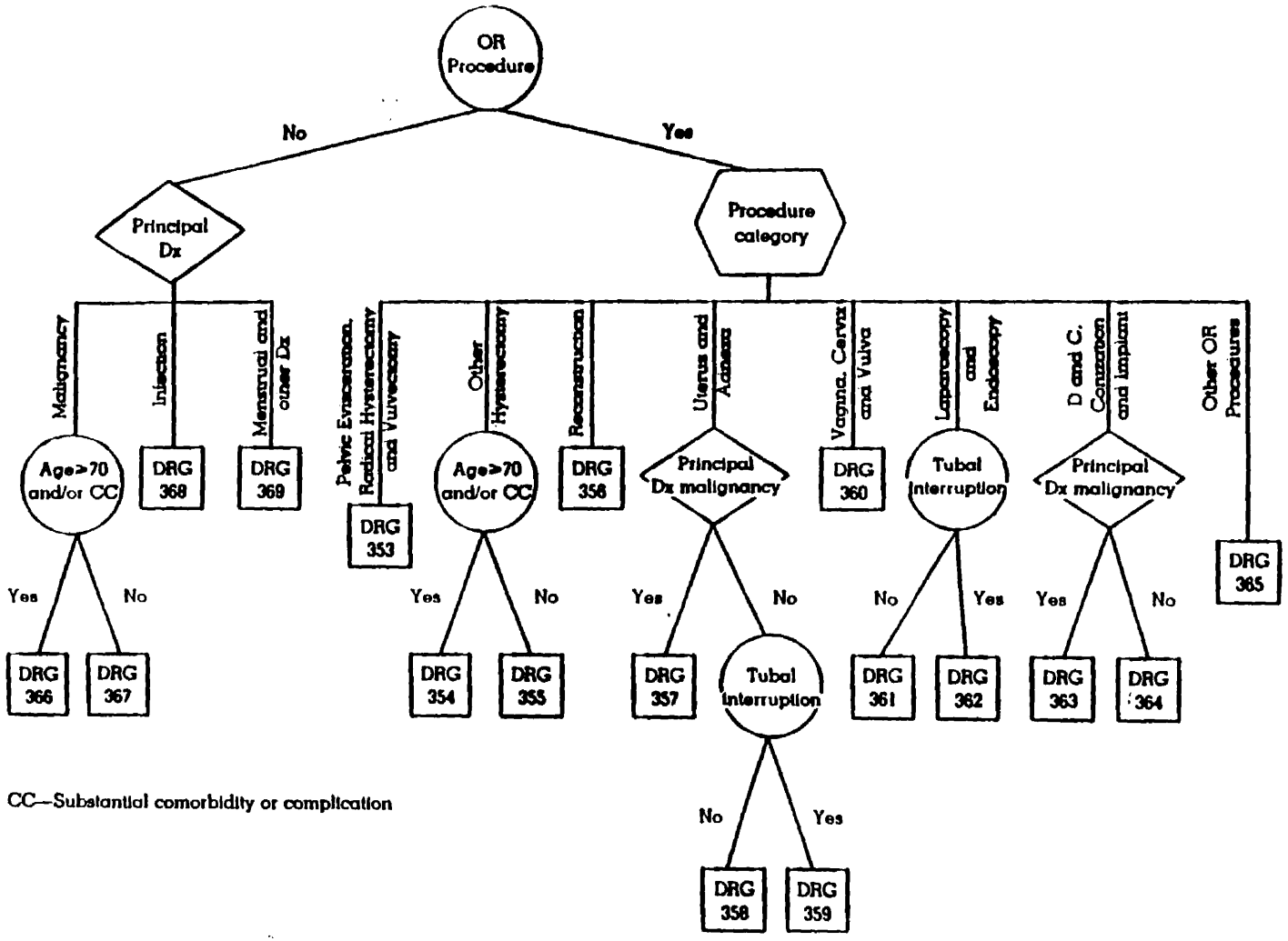
As an example of how each MDC is partitioned into DRGs, consider MDC 13: Diseases and Disorders of the Female Reproductive System. The classification of discharges into DRGs or case types within this MDC is summarized in the tree diagram presented in Figure 2-2 on page 31. Geometric symbols (diamond, circle, hexagon), represent decision points in the division process and contain the variable used in the decision. Lines emanate from the symbol indicating how the groups were split on the basis of that variable. Final groups or DRGs are represented by squares. Inside each square is the sequential DRG number.

Medical hospitalizations in MDC 13 are divided into three diagnostic groups corresponding to diagnoses of malignancy, infection, and menstrual and other diagnoses. Discharges with a malignancy diagnosis are further partitioned on whether or not age is greater than or equal to 70 years and/or there are substantial comorbidities or complications. Thus, medical hospitalizations, with a principal diagnosis pertaining to diseases and disorders of the female reproductive system, are divided into four case types or DRGs.

Surgical hospitalizations in MDC 13 are divided into eight procedure categories: (1) pelvic evisceration, radical hysterectomy, and vulvectomy, (2) other hysterectomy, (3) reconstructive procedures, (4) uterus and adnexa procedure, (5) vagina, cervix and vulva procedures, (6) laparoscopy and endoscopy, (7) D&C, conization, and radio-implant, (8) other OR [Operating Room] procedures. The surgical hierarchy of these categories follows in the same order. Within this hierarchy, for example, a discharge with both D&C and a hysterectomy would be assigned to the hysterectomy category. As indicated in the diagram, four of these categories are further partitioned on the basis of age and/or the presence of substantial comorbidities or complications, principal diagnosis of malignancy, and tubal interruption.

In summary, surgical hospitalizations with a principal

FIGURE 2-2 -- MAJOR DIAGNOSITC CATEGORY (MDC) 13: DISEASES and DISORDERS OF THE FEMALE REPRODUCTIVE SYSTEM and ITS PARTIONING INTO DIAGNOSTIC RELATED GROUPS (DRGs)



CC—Substantial comorbidity or complication

Source: Fetter, Robert B. and Freeman, Jean L., "Diagnostic Related Groups: Product Line Management with Hospitals," Academay of Management Review. 1986; vol. 11, No. 1.

> diagnosis pertaining to diseases and disorders of the female reproductive system are divided into thirteen case types or DRGs. (6)

DRGs and Prospective Payment

Yale's completion of the DRG system was concurrent with the federal government's realization that its retrospective, cost-based payment system had to be changed to a prospective system. Although DRGs, as mentioned earlier, were originally developed to facilitate utilization review, it appeared that they could also be used for a prospective payment system. However, this required placing a financial value on each DRG.

To do this, the costs of providing care to hundreds of thousands of cases across the country were studied and analyzed. Each patient's individual hospitalization bill was compared to the cost report for that particular hospital. The government was then able to determine an estimated cost for each particular case. Thus, the average per-case cost of thousands of cases with each DRG classification was able to be determined. Furthermore, the average cost per case for <u>all</u> cases studied was also determined. The government was then able to design a weighting index for each DRG by comparing the average costs of <u>all</u> DRGs. For example, if the average cost of <u>all</u> DRGs is $4,000, it is assigned the weighting index of 1.0 If the average cost for DRG 78 is $4,400, it is assigned the index of 1.1 ($4,400 divided by $4,000). Likewise, if the average cost of DRG 196 is $2,718, it is assigned the index of 0.68 ($2718 divided by $4,000). In this example, the weighting index indicates that, on the average, DRG 78 uses 10% more resources than the average DRG and DRG 196 uses only 0.68%.[1,6,7]

This weighting mechanism was then used to determine a

> numerical value to measure the relative complexity of cases treated by any particular hospital. A hospital's costs are assumed to be a function of two elements: (1) the cost of its individual resources and (2) the complexity of the cases that the hospital treats. The complexity of a hospital could now be measured by a case-mix index, which is the sum of the weighting factors assigned to the DRGs treated at that particular hospital. To be equitable in any reimbursement scheme involving average costs, hospitals should be given credit for the relative complexity of the cases that are treated there compared to other hospitals. Ultimately, the reimbursement is based on two primary factors: (1) average costs and (2) relative complexity. At this juncture, it is important to recognize that hospital management faces two challenges: first, to effectively utilize hospital resources (contain costs) and second, to define the complexity of each case accurately, since the accuracy of that definition translates directly into a specific payment. (1)

Adapting to a Prospective Payment System

As a starting point, the PPS was to include the Medicare costs associated with an inpatient hospital stay which included bed, board, nursing, ancillary services, malpractice insurance costs, etc. The complexity of hospitals' cost structures made it too cumbersome for a comprehensive prospective payment system to be effective in a short period of time. Therefore, only inpatient services were covered. Those costs that continued to be paid under the retrospective payment system included services to out-patients, capital costs, medical education in teaching hospitals, and Medicare bad debt.[8,9]

Congress' ultimate goal is to include all costs in the Prospective Payment System. This was to have been accomplished by October 1, 1986[1] but there continues to be a heated debate over this issue between the hospitals, through the American Hospital Association, and Congress over the methodology. Capital costs, because they vary widely from hospital to hospital due to different debt structure, range and complexity of

services offered, and the age of the plant and equipment, are the most difficult of the costs to pay on a prospective basis.[1]

However, through the PPS, the government has had greater control over health care expenditures and can more accurately predict what its expenditures will be in any fiscal year. Prior to PPS, these expenditures were difficult at best to project because they were a "function of hospital spending, and the level of spending was not known until after the fact, whereas the level of spending can now be defined before the fact."[1]

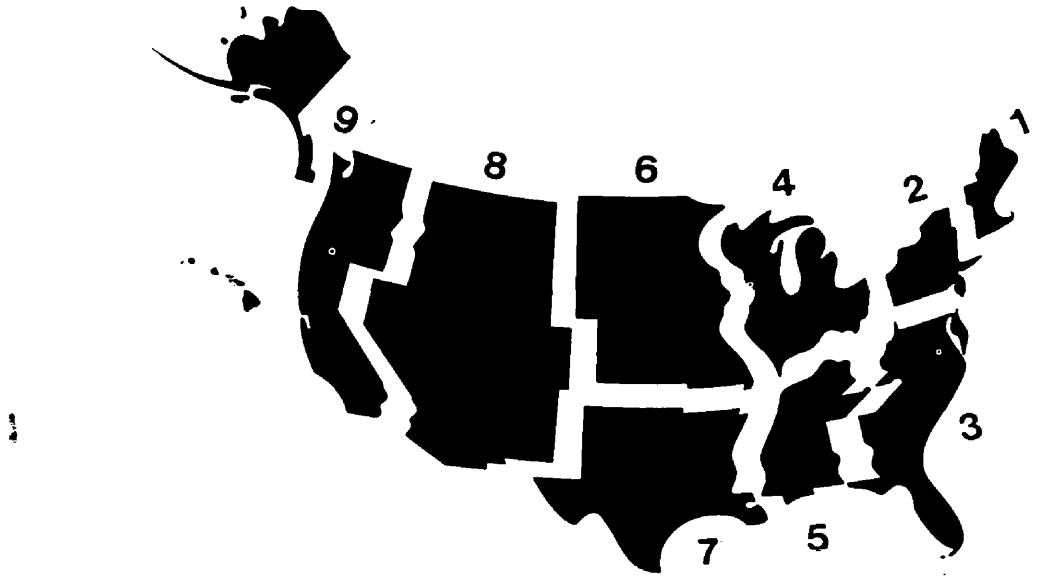
Hospital Negotiated Changes

Obviously, hospitals were concerned about such an abrupt change in the Medicare reimbursement system and successfully lobbied Congress for some changes in the original PPS structure.

> Hospitals wanted recognition of different and unique cost structures and the difficulty of adjusting to payments based on national averages within a very short period of time. Their ability to be cost effective with respect to those payment levels had a significant impact on the short-term viability of some of those hospitals. In addition, recognition had to be given to the variance in costs and treatment patterns across the nation. Typically, hospitals in the Northeast and Midwest were more costly than those in the West and Southwest. As an example, average cost per discharge in Region 9 (West Coast) was $2918, but the average cost per discharge in Region 5 (Alabama, Kentucky, Missouri, and Tennessee) was $2,450. (1)

Congress acknowledged these problems with a phasing-in mechanism which addressed the fact that regional, as well as urban and rural, average costs were different from national average costs and that individual hospital costs were different within each region. (See Figure 2-3 and Table 2-1 on page 35). Thus, hospitals were able to move

FIGURE 2-3 -- PROSPECTIVE PAYMENT SYSTEM'S REGIONAL DIVISIONS



Source: Hospital Statistic's. American Hospital Association, Chicago, Ill., 1988. 1 = New England; 2 = Middle Atlantic; 3 = South Atlantic; 4 = East North Central; 5 = East South Central; 6 = West North Central; 7 = West South Central; 8 = Mountain; 9 = Pacific.

TABLE 2-1 -- REGIONAL DIAGNOSTIC RELATED GROUP RATES, BOTH URBAN and RURAL
EFFECTIVE OCTOBER 1,1983

Region	Urban	Rural
New England	$2.981	$2.487
Middle Atlantic	$2.736	$2.484
South Atlantic	$2.777	$2.211
East North Central	$3.021	$2.416
East South Central	$2.511	$2.201
West North Central	$2.888	$2.220
West South Central	$2.718	$2.142
Mountain	$2.716	$2.253
Pacific	$2.931	$2.406

Source: Rusynko, Barbara, "DRGs, Who, What, How, Where," Today's OR Nurse. April 6, 1984, vol. 4.

gradually from a system based on individual hospital costs to a system based on national averages. The hospital could use its own base-year costs as a starting point and carry that figure forward, adjusting for inflation, into each of the first four prospective payment years. (1981 costs were designated as the base-year). Throughout the four year phase-in period, the proportion of the DRG payment that was based on specific hospital costs would gradually decrease, and the proportion of the DRG payment that was based on national averages would gradually increase.[1,3,10] (See Table 2-2 below).

TABLE 2-2 -- PHASE-IN SCHEDULE OF DRG PAYMENTS BASED ON NATIONAL AVERAGES

Year	Hospital Specific %	Regional Specific %	National Average %
1	75	25	0
2	50	37.5	12.5
3	25	37.5	37.5
4	0	0	100

Source: Morgan, Lloyd B. and Koppel, Craig A., "An Overview of DRG Regulations - the impact of changing reimbursement patterns," Topics in Health Care Financing. Spring, 1985.

This phasing-in mechanism provided hospitals with time to adjust their cost structures and included a means for dealing with regional cost differences.

Hospitals also won recognition of unusual cases involving comorbidity and complications, as was discussed earlier. These cases were termed "outliers"[1] and required payment above and beyond the DRG payment. In order to receive additional payments due to comorbidity and/or complications, the excess days in the patient's length of stay or

unusually high costs had to be reviewed and certified as medically necessary.

Exclusions

A number of specific hospitals were (and still are) excluded from the PPS because their cost structure is much less predictable than a primary acute care hospital and they do not fit easily into a DRG system which relies heavily on averages and gives little consideration to unusual situations. These include rehabilitation hospitals, veteran's hospitals, children's hospitals, psychiatric hospitals (scheduled to begin PPS in 1990),[11] and long-term care facilities. Separate rehabilitation and psychiatric units within regular acute care hospitals were also excluded. However, Congress hopes to include them under the umbrella of PPS in the not too distant future.[1,10,11]

Oversight of the PPS

Congress also provided for the oversight of the Prospective Payment System through a fifteen member commission, appointed by the Office of Technology Assessment (OTA), to determine rate increase factors applied to hospital payments on a year-to-year basis and to review the recalibration of DRGs as practice patterns changed and responded to the incentive to minimize the resources necessary to treat any particular patient effectively. In addition to providing oversight to the PPS, this commission was authorized to perform a utilization review of hospital admitting patterns so that a patient who would have ordinarily been treated with one hospital stay and one payment was not suddenly treated with two hospital stays and two payments. Congress, however,

was not bound by any rate or DRG recalibration recommendations made by this committee.[1,3,6]

The Impact of the Prospective Payment System

Prior to PPS, revenues were the main focus of hospital financial management. Revenues continued to be a focus of hospital financial management after the implementation of PPS, however, the main focus shifted to an effective, productive, and efficient use of resources. Hospitals also began a new era of cooperation with their medical staffs as physician practice patterns were reviewed in order to treat patients with the fewest resources that could be effective without reducing the quality of care. Hospitals even began to scrutinize services that were unprofitable and in many cases discontinued those services that were not cost effective.[12]

Marketing became a major activity around hospitals as decreasing occupancies caused institutions to actively compete for patients - an activity almost unheard of before. Hospitals began to aggressively market themselves in order to protect and increase their market share of patients. Ambulatory services, which are still cost-based reimbursed, were (and still are) aggressively marketed in an effort to increase volume.[1,12]

Initially, there was considerable concern that hospitals would make major cost-shifting adjustments - adjust charges so that the commercial insurance companies and private-pay patients would make up the loss in revenue caused by PPS. Price cutting, however, is what has actually happened in almost every industry that has been deregulated and where supply exceeded demand. It also happened in the hospital industry as

both a positional technique and a survival mechanism in the marketplace.[1,12]

Hospitals that had lower costs than the national average received additional revenues beyond what they would have received under the retrospective payment system. These were generally small community hospitals, which by their very nature do not have a cost structure as high as many of the larger and more complex hospitals.[1] Those hospitals with costs higher than the national average, due, at least in part, because of consumer demand for medical specialists and/or high technology, either found ways to reduce their costs or actively pursued affiliations, consolidations, or mergers with other institutions to gain economies of scale.[12] Some hospitals actually ceased to exist.[1,12]

PPS forces hospitals and physicians to maintain the present quality of care but to maintain it at a lower cost. This requires the appropriateness of any test to be carefully evaluated by physicians. Unless new technology can be cost justified, hospitals are unwilling to purchase it. Whether or not this will reduce the demand for technological innovation or reduce the rate at which research and development dollars are invested toward technological developments remains to be seen.[13]

Has The PPS Saved Medicare Hospitalization Dollars?

As has already been discussed, the purpose of the Medicare Prospective Payment System was to decrease the rapid increase of Medicare hospitalization expenditures. The government wanted hospitals to contain costs through increases in productivity, and cost effective as well as efficient treatments and procedures. The government did not

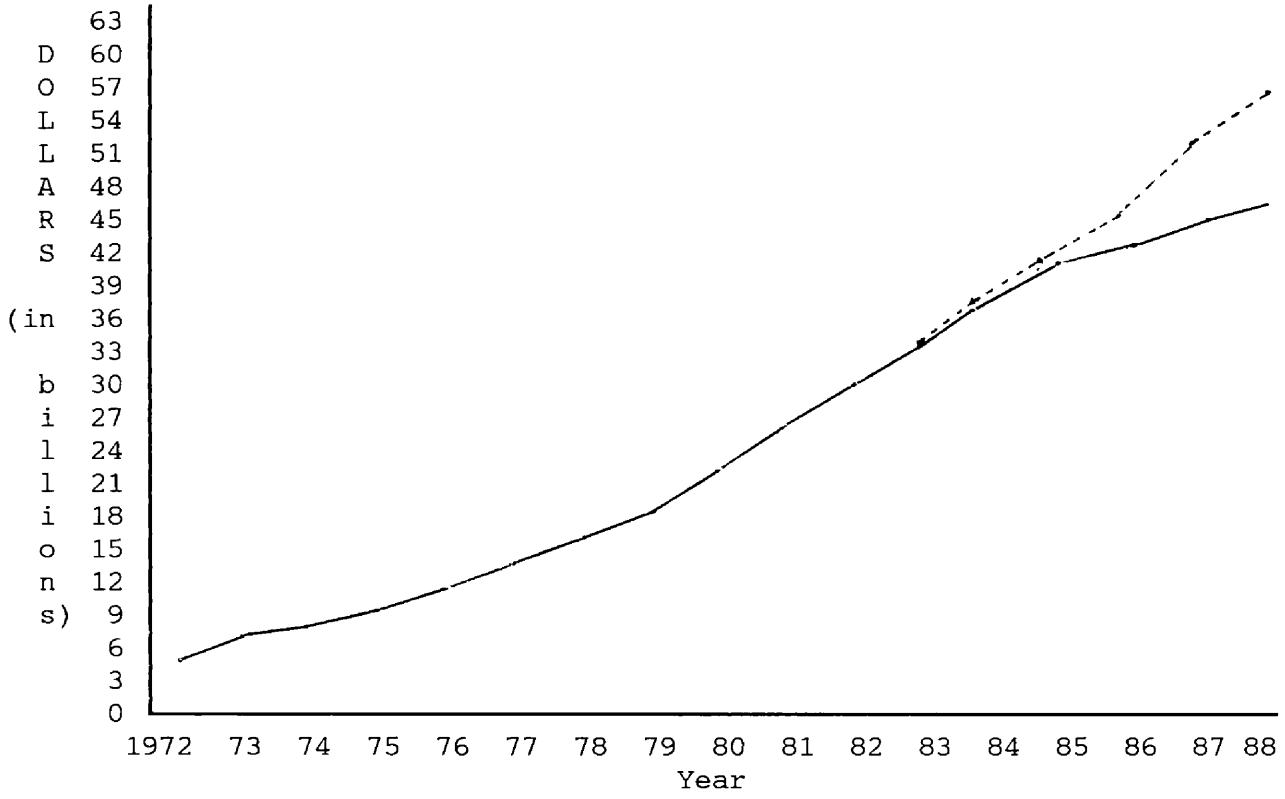
stipulate how the hospitals were to obtain increases in productivity, cost effectiveness, and efficiency; however, through DRG reimbursement, it was exceedingly clear they they intended to reduce the rate of inpatient hospitalization costs for Medicare patients. The question is: did they?

Consider Figure 2-4 on page 41. It demonstrates graphically Medicare's hospitalization expenditures from 1972 thru 1988.

This graph repeats the earlier demonstration of years 1972 thru 1983. For years 1984 thru 1988, the continuation of the black line represents Medicare's actual payments for inpatient hospital services.[2] The red dotted line indicates anticipated Medicare expenditures had the Retrospective Payment System remained in effect. The anticipated expenditures are based on Linear Regression[14] using the four years prior to each determined year in order to estimate what each determined year's expenditures would have been.

After the implementation of PPS, Medicare's hospitalization expenditures in 1984 were $38.5 billion and increased to $46.9 billion in 1988. Had the Retrospective Payment System remained in effect, it is estimated that the 1984 hospitalization expenditure would have been $39,2 billion increasing to $56.5 billion in 1988. Adding the difference between the estimated and the actual expenditures for the first five years of the PPS, suggests that Medicare has saved approximately $27.6 billion.

FIGURE 2-4 -- MEDICARE HOSPITALIZATION EXPENDITURES 1972 THRU 1988



Source: "Table 2, Discharges, average length of stay, days of care, total charges, and program payments for Medicare hospital beneficiaries receiving short-stay hospital inpatient services, by Medicare status of the beneficiary: Calendar years 1972-1983." Health Care Financing Administration; Baltimore, Maryland. Unpublished.

Table 2-3 below, lists Medicare's actual hospitalization expenditures from 1972 thru 1988. It also lists the amount of additional dollars spent over the prior year and the percentage of increase from the prior year.

TABLE 2-3 --MEDICARE HOSPITALIZATION EXPENDITURES, INCREASED YEARLY EXPENSE, and YEARLY PERCENTAGE OF INCREASE

Year	Expenditure (in billions)	Increase over Prior Year (in billions)	% of Increase
1972	$ 5,576	---	---
1973	6,446	$ 870	15.7%
1974	7,837	1,391	21.6

Year	Expenditure (in billions)	Increase over Prior Year (in billions)	% of Increase
1975	9,748	1,911	24.4
1976	11,803	2,055	21.1
1977	13,944	2,141	18.1
1978	16,008	2,064	14.8
1979	18,463	2,455	15.3
1980	22,099	3,636	19.7
1981	25,936	3,837	17.4
1982	30,601	4,665	18.0
1983	34,338	3,737	12.2
1984	38,500	4,162	12.1
1985	40,200	1,700	4.4
1986	41,781	1,581	3.9
1987	44,068	2,287	5.5
1988	46,879	2,811	6.4

This table rather dramatically demonstrates that after the implementation of the Prospective Payment System in October, 1983, the rate of increase for Medicare hospitalization expenditures decreased. Under the Retrospective Payment System, the yearly percentage of increase varies from 12.2% to 24.4%. 1983 was the final year that Medicare reimbursed hospitals under the Retrospective Payment System and it had the lowest percentage of increase while this system was in effect - 12.2%. Undoubtedly, hospitals spent this year implementing cost containment measures in preparation for the PPS. In 1984, the first full year of the PPS, the percentage of increase was 12.1%. However, during this first year, hospitals were reimbursed at 75% of costs and 25% of regional average costs and, therefore, were not drastically affected by the PPS. The remaining years of the Prospective Payment System, 1985 thru 1988, saw increase ranging from 4.4% to 6.4%. It is indeed obvious that the Prospective Payment System caused a decline in the yearly increase of Medicare's hospitalization expenditures.

Having reviewed the evolution of the Retrospective Payment System and its cost-based reimbursement policy, the implementation of the Prospective Payment System, and establishing that the PPS lowered Medicare's increasing rate of hospitalization expenditures, it is now time to determine what changes, if any, the Prospective Payment System has had on hospital productivity. The next chapter establishes a productivity framework - defining what productivity is, what is going to be measured, how it is measured, and explaining how the different components are involved in hospital productivity.

REFERENCES

1. Morgan, Lloyd B. and Koppel, Craig A., "An Overview of DRG Regulations - the impact of changing reimbursement patterns," Topics in Health Care Financing. Spring, 1985.

2. _____, "Table 2, Discharges, average length of stay, days of care, total charges, and program payments for Medicare hospital beneficiaries receiving short-stay hospital inpatient services, by Medicare status of the beneficiary: Calendar years 1972-1983." Health Care Financing Administration; Baltimore, Maryland. Unpublished.

3. Doremus, Harvey D., "A Reimbursement System that Limits the Costs of Hospital Care," Healthcare Financial Management. April, 1983; pp.: 86-91.

4. Goldsberg, Harold L., M.D., Prospective Payment DRGs: New Jersey and the USA," Neurology. August, 1984; pp.: 1073-1076.

5. Bainard, Cynthia and Esmond, Truman, Jr., "DRGs - A Progress Report for the Providers Viewpoint," Healthcare Financial Management. January, 1982.

6. Fetter, Robert B. and Freeman, Jean L., "Diagnosis Related Groups: Product Line Management with Hospitals," Academy of Management Review. 1986; vol. 11, No. 1; pp.: 41-54.

7. Rusynko, Barbara, "DRGs, Who, What, How, Where," Today's OR Nurse. April 6, 1984, vol. 4; pp.: 8-13.

8. Schweiker, R.S., "Hospital Prospective Payment for Medicare," Report to Congress. Department of Health and Human Services, December, 1982.

9. _____, "Rules and Regulations, Federal Register. U.S. Government Printing Office, Washington, D.C.; September 1, 1983; vol. 48; no. 171; pp.: 39768-39777.

10. Grimaldi, P.L. and Micheletti, J.A., Diagnostic Related Groups, 2nd ed. Pluribus Press Inc., Chicago: 1983, pp. 96-102.

11. English, J., Sharfstein, S., Scherl, D., et al., "Diagnosis-related Groups and General Hospital Psychiatry: the APA Study," American Journal of Psychiatry. 1987; vol. 143; pp.: 131-139.

12. Feldstein, Paul J., Health Care Economics. John Wiley & Sons, New York: 1988, pp. 311, 339-340.

13. Albertson, David, The Fact Book on Prospective Payment. Health Industry Manufactures Association, New York: 1986, pp. 88-106.

14. Mason, Robert D., Lind, Douglas A., and Marshal, William G., Statistics An Introduction. Harcourt Brace Jovanovich, Inc., New York: 1983, p. 400,

_____, The Social Security Act of 1983 (P.L. 98-21). U.S. Government Printing Office; Washington D.C.: 1983, pp. 143-503.

CHAPTER THREE: DEVELOPING A HOSPITAL PRODUCTIVITY FRAMEWORK

Defining the Product

Hospital productivity has been an elusive measure. This elusiveness is because the hospital industry, the insurance intermediaries, and the government could not simultaneously agree on how to define what the hospital's product was. However, with the implementation of the Prospective Payment System, there is greater impetus to accept the discharged patient as the hospital's product. In fact, both the Health Care Financing Administration (HCFA) and the Prospective Payment Commission (ProPAC) have begun to formulate hospital producitvity using the discharge as the final product.[1,2] Use of the patient discharge as the final product is also the subject of two soon to be published papers on hospital productivity.[3,4]

Texts on Economics define productivity as output per worker hour,[5] where per unit labor cost is mathematically expressed by:

$$\frac{W \times L}{Q} = \frac{W}{Q/L}$$

where W equals the wage rate, L equals worker hours, and Q equals output. Thus, for a given wage rate, increases in output per worker directly lowers unit labor costs. Additionally, capital productivity is defined as the value of goods and services in constant dollars produced per unit of capital services.[6] There is also multifactor productivity. It is the value of goods and services in constant prices produced per combined unit of capital and labor inputs.[6] It is the output per worker

hour, however, that this paper is concerned with. But what is the hospital's output? What is it that the hospital produces?

When we look at a car manufacturing plant we know that it produces cars and its output is measured in the numbers and quality of cars it produces. When we view a paper mill we know that it produces paper and its output is measured in tons of paper produced. "Hospital production, [however], is not the same as production in a factory where there are clear standards and criteria pertaining to the utilization of materials, labor, and equipment. In manufacturing, design quality, and performances are subject to continual monitoring, measurement, feedback, and adaptation of the process of production."[3] Nonetheless, hospitals do use raw materials in the form of labor, supplies, and equipment to produce a product. It is defining the hospital's product that has been the center of many debates.

Hospitals have been reluctant to view a discharged patient as their finished product. This is due, at least in part, to the fact that not all discharges are "successful outcomes." Some patients, due to their individual circumstances, are not thought to be whole upon discharge. There are those who are involved in motor vehicle accidents and leave the hospital permanently dismembered or handicapped. And, of course, there are those patients who die. The community and the hospital industry prefer to view hospitals as institutions where people go to have medical problems alleviated and resolved and from which people emerge as healthy, productive members of society. For the most part, this is true - but not always. Therefore, individual hospitals used varying activities to measure specific products.

The activities of distinct departments were often used to demonstrate how busy or how productive the hospital was. The number of tests run by the laboratory, the number of therapeutic procedures performed by physical therapy, the number of births, the number of surgeries, the number of admissions, etc., are all examples of statistics maintained by hospitals to indicate how active they are. In fact, the American Hospital Association publishes each year a survey called Hospital Statistics that has more than 200 pages of the different statistics monitored by the hospital industry (see Table 3-1 on pages 49-50 for a sample of the data available in these volumes).

With the advent of the Prospective Payment System and the use of Diagnostic Related Groups, there has been greater emphasis on viewing the hospital's discharges as its product. This is the reason hospitals receive payment. It also defines the main business of the institution: "...to accept, one at a time, human beings who have a problem, a disease, or a disorder, and to evaluate and treat, through physicians and other professionals, the problem and the patient. Under the direction of these professionals, the institution provides a set of goods and services deemed appropriate to the diagnosis and treatment of the illness. It is this bundle of things that we define as the product of the hospital."[3] To focus simply on the intermediate product is to miss the point of the enterprise: to treat patients who have illnesses.

These "bundles of things" have been the conversion of labor, supplies, and equipment into standard outputs such as clean linens, meals, medications, laboratory procedures, surgical procedures, etc., that hospitals have so often used to indicate how active they were. "But these outputs do not constitute the real business of the hospital,

Table

1

Trends in Utilization, Personnel, and Finances for Selected Years from 1946 through 1987

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CLASSIFICATION	YEAR	HOSPITALS	BEDS (In thousands)	ADMISSIONS (In thousands)	AVERAGE DAILY CENSUS (In thousands)	ADJUSTED AVERAGE DAILY CENSUS (In thousands)	OCCUPANCY, percent	AVERAGE LENGTH OF STAY, days	OUTPATIENT VISITS (In thousands)	NEWBORNS		FTE PERSONNEL		EXPENSES					
														LABOR			TOTAL		
										Bassinets	Births	Number (In thousands)	Per 100 Adjusted Census	PAYROLL Amount (In millions of dollars)	EMPLOYEE BENEFITS Amount (In millions of dollars)	Adjusted, per Inpatient Day (dollars)	Amount (In millions of dollars)	Adjusted, per Inpatient Stay (dollars)	Adjusted, per Inpatient Day (dollars)
Total United States	1946	6,125	1,438	15,675	1,142		79.5			85,585	2,135,327	830		$ 1,103			$ 1,963		
	1950	6,788	1,456	18,683	1,253		86.0			90,101	2,742,780	1,050		2,181			3,651		
	1955	6,956	1,804	21,073	1,383		85.0			98,823	3,478,753	1,301		3,582			5,594		
	1960	6,876	1,858	25,027	1,402		84.8			102,764	3,835,735	1,599		5,588			8,421		
	1965	7,123	1,704	28,812	1,403		82.3		126,793	101,287	3,565,344	1,952		8,551			12,948		
	1970	7,123	1,818	31,758	1,298		80.3		181,370	97,128	3,537,000	2,537		15,708			25,556		
	1971	7,097	1,556	32,884	1,237		79.5		199,725	94,344	3,464,513	2,589		17,635	$ 1,531		28,812		
	1972	7,061	1,550	33,285	1,209		78.0		219,182	92,960	3,231,875	2,671		19,530	1,825		32,667		
	1973	7,123	1,535	34,352	1,189		77.5		233,555	90,071	3,087,210	2,769		21,330	2,238		36,290		
	1974	7,174	1,513	35,508	1,167		77.2		250,481	88,269	3,043,366	2,919		23,821	2,611		41,408		
	1975	7,156	1,488	36,157	1,125		76.7		254,844	86,875	3,081,629	3,023		27,135	3,175		48,706		
	1976	7,082	1,434	36,776	1,080		76.0		270,951	85,284	3,067,083	3,108		30,438	3,848		56,005		
	1977	7,099	1,407	37,080	1,066		75.8		283,775	83,193	3,223,699	3,213		33,742	4,691		63,630		
	1978	7,015	1,381	37,243	1,042		75.5		283,606	80,650	3,250,373	3,280		37,196	5,378		70,927		
	1979	6,968	1,372	37,802	1,043		76.1		282,009	79,720	3,376,467	3,382		41,464	6,155		79,798		
	1980	6,965	1,365	38,892	1,080		77.7		282,951	79,842	3,500,043	3,492		46,970	7,221		91,886		
	1981	6,933	1,362	39,188	1,061		77.9		285,332	78,823	3,558,274	3,661		54,516	8,738		107,146		
	1982	6,915	1,360	39,095	1,053		77.4		313,867	77,998	3,615,751	3,746		62,015	10,420		123,219		
	1983	6,888	1,350	38,887	1,026		76.1		273,168	77,837	3,598,148	3,707		67,742	12,036		136,315		
	1984	6,872	1,339	37,938	970		72.5		276,568	77,845	3,563,106	3,630		71,007	13,005		144,114		
	1985	6,872	1,318	38,304	910		69.0		282,140	77,202	3,630,961	3,625		74,387	13,875		153,327		
	1986	6,841	1,290	38,219	883		68.4		294,634	76,002	3,680,178	3,647		78,589	14,400		165,194		
	1987	6,821	1,267	34,439	873		68.9		310,707	74,770	3,698,294	3,742		83,778	15,318		178,862		
Federal	1946	404	236	1,583	186		79.3			2,378	37,273	182		247			373		
	1950	414	188	1,294	152		80.4			2,625	83,133	169		520			712		
	1955	428	183	1,415	157		85.8			4,070	157,197	182		666			837		
	1960	435	177	1,476	154		87.2			4,097	148,232	186		921			1,134		
	1965	443	174	1,640	150		86.1		30,393	4,170	145,096	199		1,264			1,568		
	1970	408	161	1,741	128		79.8		42,813	3,834	128,943	218		1,751			2,483		
	1971	407	148	1,788	123		83.2		46,504	3,788	126,228	225		1,962	133		2,821		
	1972	401	143	1,770	114		80.0		46,095	3,589	112,218	232		2,132	166		3,148		
	1973	397	142	1,865	112		79.0		47,848	3,202	100,013	238		2,384	179		3,524		
	1974	397	136	1,841	109		80.7		48,882	3,037	95,937	244		2,651	204		3,971		
	1975	382	132	1,913	107		80.7		51,957	3,018	92,971	256		2,928	244		4,540		
	1976	380	129	1,998	102		79.3		56,188	2,953	104,745	269		3,415	291		5,313		
	1977	377	124	2,018	96		78.6		53,142	2,949	108,897	278		3,949	325		6,163		
	1978	370	122	1,997	90		78.4		50,353	2,853	83,786	277		4,288	399		6,732		
	1979	361	117	1,986	82		78.2		51,239	2,440	89,302	273		4,566	424		7,266		
	1980	359	117	2,044	84		80.1		50,566	2,297	91,332	279		4,927	457		7,869		
	1981	348	116	2,032	81		79.0		52,555	2,246	92,561	283		5,380	502		8,606		
	1982	348	114	2,014	80		79.4		56,068	2,251	100,990	297		5,849	536		9,506		
	1983	342	113	955	81		80.5		52,317	2,358	105,617	286		6,460	673		10,679		
	1984	341	112	2,074	80		79.0		52,813	2,255	108,612	290		6,863	729		11,156		
	1985	343	112	2,103	85		79.3		52,342	2,269	108,400	299		7,624	778		12,335		
	1986	342	111	2,117	82		74.1		53,851	2,312	95,628	286		7,841	815		13,133		
	1987	342	110	2,085	81		73.7		56,556	2,252	95,868	297		8,196	964		13,688		

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Nonfederal long-term general and other special	1946	389	83	139	63		75.9			1,298	8,162	28		$ 38			$ 68		
	1950	412	70	164	60		85.7			1,211	17,720	34		72			117		
	1955	402	78	158	65		85.5			882	9,534	47		128			192		
	1960	308	67	151	56		86.9			392	8,888	55		192			273		
	1965	283	66	168	56		85.3		1,277	222	6,434	65		287			406		
	1970	236	60	132	49		82.0		1,389	152	4,751	69		431			649		
	1971	218	54	97	45		83.4		1,020	65	585	63		438	$ 40		638		
	1972	218	54	106	45		83.0		1,511	22	123	63		485	52		718		
	1973	229	57	112	47		82.1		1,629	6	38	67		536	60		805		
	1974	221	54	106	45		82.5		1,630	4	50	69		571	65		873		
	1975	215	51	103	42		82.1		1,189	4	38	68		611	76		966		
	1976	197	49	100	40		82.7		1,487	5	1	66		657	86		1,051		
	1977	189	45	88	38		84.3		1,342	3	0	63		662	103		1,071		
	1978	169	41	80	35		84.0		1,085	2	0	58		658	106		1,056		
	1979	165	40	81	35		86.1		1,249	0	2	61		702	118		1,148		
	1980	157	39	76	33		85.9		949	5	2	56		722	129		1,193		
	1981	148	35	77	30		86.2		1,028	10	26	61		799	135		1,318		
	1982	138	34	76	30		87.8		1,274	8	0	59		888	170		1,503		
	1983	131	30	73	28		88.5		1,100	8	0	53		894	178		1,500		
	1984	131	30	76	27		88.7		1,030	3	27	54		975	202		1,651		
	1985	128	31	82	27		88.1		2,087	34	1,265	58		1,088	243		1,878		
	1986	133	30	81	27		88.8		1,284	2	18	58		1,171	255		1,997		
	1987	131	28	79	25		87.2		1,569	2	10	55		1,214	254		2,159		
Total nonfederal short-term general and other special (These data are totals of the data in the next three classifications)	1946	4,444	473	13,856	341		72.1	9.1		80,987	2,087,503	505		619			1,169		
	1950	5,031	505	16,683	372		73.7	8.1		86,019	2,660,982	662		1,203			2,120		
	1955	5,237	568	18,100	407		71.5	7.8		93,868	3,304,451	826		2,117			3,434		
	1960	6,407	839	22,970	477		74.7	7.6		98,127	3,878,051	1,080		3,499			5,617		
	1965	6,736	741	26,463	563	620	76.0	7.8	82,831	96,782	3,413,370	1,386	224	5,644			9,147	$ 316.37	$ 40.56
	1970	6,859	848	29,252	662	727	78.0	8.2	133,545	93,079	3,403,064	1,929	265	11,421			19,560	804.59	73.73
	1971	6,865	867	30,142	665	736	78.7	8.0	148,423	90,444	3,337,605	1,998	272	13,053	1,176	$ 53.10	22,400	887.44	83.43
	1972	6,843	884	30,777	664	739	76.2	7.9	166,983	88,315	3,119,448	2,056	278	14,519	1,476	58.24	25,548	747.42	94.61
	1973	6,891	903	31,761	681	768	75.4	7.8	178,839	86,851	2,967,089	2,149	280	15,867	1,731	62.86	28,498	793.88	101.78
	1974	6,977	931	32,943	701	793	75.3	7.8	194,839	85,208	2,947,342	2,269	289	17,861	2,030	68.76	32,751	883.04	113.21
	1975	6,978	947	33,519	708	808	74.8	7.7	196,311	83,834	2,998,580	2,399	298	20,749	2,469	79.00	39,110	1,024.72	133.08
	1976	6,956	961	34,068	715	818	74.4	7.7	207,726	82,307	2,982,305	2,483	304	23,437	3,053	88.08	45,402	1,172.25	152.24
	1977	6,873	974	34,353	717	820	73.8	7.8	204,238	80,228	3,117,756	2,581	315	26,062	3,743	99.63	51,832	1,318.70	173.25
	1978	6,935	980	34,575	720	825	73.5	7.8	204,461	78,090	3,156,570	2,662	323	29,034	4,329	110.82	58,348	1,470.13	193.81
	1979	6,923	988	35,160	729	841	73.8	7.8	203,873	77,277	3,287,157	2,762	328	32,899	5,018	122.95	66,184	1,631.16	215.75
	1980	5,904	992	36,198	748	861	75.4	7.8	206,752	77,539	3,408,899	2,879	334	37,480	5,914	137.74	76,970	1,844.19	244.44
	1981	5,879	1,007	36,494	764	878	75.9	7.8	208,729	78,567	3,465,683	3,039	347	44,142	7,271	160.88	90,739	2,187.70	283.94
	1982	5,863	1,015	36,429	763	882	75.2	7.8	250,888	75,739	3,514,761	3,110	353	50,787	8,832	185.26	105,094	2,493.08	328.68
	1983	5,843	1,021	36,201	750	869	73.4	7.8	213,995	75,471	3,490,829	3,102	357	55,848	10,222	207.84	116,632	2,775.55	368.01
	1984	5,814	1,020	35,202	703	824	68.9	7.3	216,474	75,567	3,456,467	3,023	367	58,319	11,042	230.09	123,550	2,984.00	409.65
	1985	5,784	1,003	33,501	650	780	64.8	7.1	222,773	74,899	3,521,298	3,003	385	60,487	11,883	253.70	130,700	3,238.94	459.57
	1986	5,728	982	32,410	631	774	64.2	7.1	234,270	73,886	3,584,530	3,032	392	63,919	12,040	269.10	140,907	3,529.60	498.19
	1987	5,659	961	31,633	624	780	64.9	7.2	247,704	72,516	3,602,416	3,120	400	68,466	12,743	285.18	152,909	3,848.79	536.96

Source: Hospital Statistics. American Hospital Association, Chicago, Ill., 1988.

caring for patients, they are really intermediary products."[3]

The labor, supplies, and equipment used in a hospital are similar to the bill of materials for a car in the manufacturing environment -- metal, engine, tires, glass, upholstery, screws, etc. Obviously, there are differences between a car factory and a health care institution. But Theodore Levitt has pointed out the importance of the analogy:

> So many things go wrong because companies fail to adequately define what they sell. Companies in so called service industries generally think of themselves as offering services rather than manufacturing products; hence they fail to think and act as comprehensively as do manufacturing companies concerned with the efficient, low cost production of customer satisfying products. (7)

Additionally, it is after discharge from the hospital that the patient's chart is coded by Medical Records Departments with the Diagnostic Related Group that defines the services provided by the hospital and reimbursement for those services. Furthermore, it is the statistic used by government and insurance intermediaries as a basis for the determination of other health statistics such as length of stay, cost per discharge, differentiation of patient's diagnoses, and many others.[8,9] Finally, the literature on the Prospective Payment System and Diagnostic Related Groups is replete with the use of, or the implied use of, "discharge" to describe the hospital's product.[10]

It, therefore, appears to be reasonable and accurate to define the hospital product as a discharge and to use the American Hospital Association and government definition of a discharge to be:

> ...the formal release of a patient by a hospital; that is, the termination of a period of hospitalization by death or disposition to place of residence, nursing home or another hospital. (8) (11)

For purposes of clarity, and to maintain an understanding of terms, a hospital is defined as:

> Short-stay special and general hospitals have six or more beds for inpatient use and an average length of stay of less than 30 days. Federal hospitals and hospital units of institutions are not included. (8) (11)

Federal hospitals and hospital units of institutions are excluded because they

do not fall within the Prospective Payment System.[2] A patient is defined as:

> A person who is formally admitted to the inpatient services of a short-stay hospital for observation, care, diagnosis, or treatment. [The] number of patients refers to the number of discharges during the year, including any multiple discharges of the same individual from one short-stay hospital or more. Infants admitted on the day of birth, directly or by transfer from another medical facility, with or without mention of disease, disorder, or immaturity are included. All newborn infants, defined as those admitted by birth to the hospital are excluded. (8)

Average length of stay is a term frequently used in the hospital industry and

is defined as:

> ...the total number of patient days accumulated at the time of discharge by patients discharged during the year divided by the number of patients discharged. (8) (11)

These terms are used extensively in the literature on the hospital industry, by government, the insurance intermediaries, and by the American Hospital Association. This paper will use these terms as defined unless otherwise stated.

The Worker

Having defined the output, or product, part of the definition of productivity, it is necessary to define who and what the worker is (productivity being the output per worker hour). Hospitals employ a number of skilled and not so skilled laborers. These include administrators, registered nurses (RN), licensed practical nurses (LPN),

various technicians and therapists, maintenance personnel, housekeepers, dieticians, secretaries, etc. All of these personnel are utilized to keep the hospital functioning and in the production of its product - the patient discharge. Most hospital employees are employed to provide direct patient care. However, a significant number of them, such as administrators, secretaries, and maintenance personnel, do not have direct patient care responsibilities.

In addition to their employment title, ie: RN, LPN, etc., hospital employees are classified by full and part-time equivalents. A full-time equivalent (FTE) is defined as an employee who works 2,080 hours in a year. The figure 2,080 is determined as follows:

40 hours per week x 52 weeks per year = 2,080 hours per year

Therefore, each full-time employee is one who works 40 hours per week for 52 weeks and is considered to be one full-time equivalent (1 FTE).

Part-time employees are those laborers who work less than 40 hours per week and are represented by a fraction of full-time equivalency. For example, if an employee works only one day per week (8 hours), the he/she represent 0.2 of a full-time equivalent (one-fifth of the work week or 8 hours divided by 40 hours).

Thus, adding full-time and part-time equivalents will provide the hospital industry's full-time equivalency. Which, when multiplied by 2,080 hours per FTE will produce the number of hours worked each year in the hospital industry. This, however, presents a rather large figure to work with. For example, in 1983 there 3,102,000 FTEs in non-federal short-stay general and other special hospitals.[11] This represents 6,452,160,000 worker hours - a rather formidable figure. It has become the standard of the industry to use FTEs as a measure of worker hours.[12]

Furthermore, both the American Hospital Association and the Health Financial Management Association publish their data using FTEs[4] as does the United States Department of Labor.[13]

There are, however, two weaknesses in the FTE data used to represent hospital labor inputs. First, the data do not reflect the use of contractual labor which causes an underestimation of actual FTEs and overstates productivity.[4] Second, only the number of FTEs employed on the last day of the year is reported. "While this measure may not accurately represent the labor hours used throughout the year, it is believed to be adequate for productivity trend analysis."[4]

The Annual Survey published each year by the American Hospital Association in Hospital Statistics is the source of information and data regarding FTEs for the government, insurance intermediaries, and the hospital industry.[1,2,4,9,11,13] To maintain consistency, it is the AHA's definition of personnel (labor) that will be used:

> Number of persons on the hospital payroll as of September 30, 19__. Personnel are recorded in Hospital Statistics as full-time equivalents(FTEs), which are calculated by adding the number of full-time personnel to one-half the number of part-time personnel, excluding medical residents, interns, and other trainees. (11)

Thus, any errors in reporting FTEs (ie: contractual labor) will remain consistent over time and should not cause significant over or under misrepresentation of hospital productivity.

Productivity

As defined earlier, productivity is the output per worker hour. The output of non-federal short-stay general and special hospitals has been defined as the discharge from the hospital. The worker hour, due to the current reporting mechanisms utilized in the hospital industry,

has been defined by the equivalent term: full-time equivalent. Therefore, the determination of productivity, for each respective year, is the result of dividing the output (discharges) by the worker hour (FTE). Proceeding in this manner, hospital productivity during the retrospective payment system and since the implementation of the Prospective Payment System can be determined. This methodology will then indicate what effect (if any) the PPS, assuming all other factors constant, has had on the productivity of non-federal short-stay general and special hospitals.

Efficiency

Gains or losses in productivity are frequently associated with gains or losses in economic efficiency - the least cost method of producing a product.[14] However, an industry can become so cognizant of its productivity levels that it may overlook other less costly methods of producing its product such as the cost of capital, supplies, equipment, etc.

The Prospective Payment System, as discussed in chapter 2, was designed and implemented with the hope that hospitals would increase productivity, efficiency, and effectiveness. Under the retrospective payment system, there was little, if any, incentive to use less costly supplies, medications, or equipment in treating illness because, for all practical purposes, whatever the hospital spent was reimbursed. The PPS required hospitals, if they wished to survive in the marketplace, to also improve how efficiently they were providing treatment for diseases and disorders. Because productivity and efficiency were expected

by-products of the PPS and are often used simultaneously, it appears to be necessary to include a measure of efficiency in this analysis.

A hospital's total expenses divided by its number of discharges will provide the institution's cost per discharge. In view of the fact that expenses for capital and medical education for teaching hospitals are treated identically under both reimbursement schemes, there was no incentive for hospitals to make adjustments in these major expenses. It seems logical and reasonable, then, to assume that decreases, or increases, in the rate of cost per discharge will provide a measure of the hospital industry's efficiency. Comparing the rate of change prior to and since the implementation of the PPS will indicate whether or not hospitals have been able to find ways of utilizing supplies, equipment, and personnel more efficiently. Combined with the information on productivity, these two measures should provide valuable data on the hospital industry's ability to contain costs under the PPS.

Effectiveness

It does little good for hospitals to improve productivity and/or efficiency if the industry does not maintain or improve effectiveness - producing the desired or expected result.[6] It is important to not only produce the intermediate products (lab test, meals, etc.) but also the final product (the discharge) efficiently. If, however, the intermediate products are not used effectively or are ordered inappropriately in the production of the final product, it is a waste of resources no matter how efficiently it is produced.[3]

The effectiveness of the hospital industry is a quality of care issue.[3] While the effect of the PPS on quality of care is uncertain

(how can it be measured?), no systematic study has suggested that the quality of care, thus the effectiveness of the hospital industry has declined.[1,2,3,15,16] "In fact, if hospitals were to respond rationally to the financial incentives [of PPS], one would expect them to implement programs to reduce those aspects of hospital care that increase the cost of hospitalization, such as iatrogenesis [disease induced by a physician's words or actions], nosocomial infections [infected while in the hospital], readmissions, and the like."[3] The risk that the quality of care may suffer still remains. However, it is subject to constant monitoring by the Professional Review Organizations (PROs) that each hospital must contract with in order to receive Medicare payments.

Perhaps the largest concern regarding quality of care (effectiveness) was the potential for hospitals to treat one disease or disorder at a time for patients with multiple problems. The discharged patient would then be readmitted under a different DRG for treatment of each illness thus producing multiple bills. The Health Care Financing Administration identified this as a potential effect of the PPS in its 1983 annual report.[3] Hospitals have traditionally treated all of the patient's conditions in a single admission whenever possible. The potential abuse of the PPS by readmitting the patient for each concurrent malady was recognized early on. However, while higher rates of admissions were predicted, they were never experienced. Rather, the rate of admissions actually decreased in each of the first three years of PPS for all age groups with the largest decrease in the 65-75 age category.[3,15,16]

Given the above recent data, it does not appear to be necessary to redetermine the hospital industry's effectiveness.

Aggregate and Regional Data

As used in the paper, the term "aggregate" is defined as the 50 states of the United States and the District of Columbia. The term "regional" is defined as the nine areas of the U.S. as described by the Bureau of the Census:

Region 1: New England

Connecticut	New Hampshire
Maine	Rhode Island
Massachusetts	Vermont

Region 2: Middle Atlantic

New Jersey	Pennsylvania
New York	

Region 3: South Atlantic

Delaware	North Carolina
District of Columbia	South Carolina
Florida	Virginia
Georgia	West Virginia
Maryland	

Region 4: East North Central

Illinois	Ohio
Indiana	Wisconsin
Michigan	

Region 5: East South Central

Alabama	Mississippi
Kentucky	Tennessee

Region 6: West North Central

Iowa	Nebraska
Kansas	North Dakota
Minnesota	South Dakota
Missouri	

Region 7: West South Central

Arkansas	Oklahoma
Louisiana	Texas

Region 8: Mountain

Arizona	Nevada
Colorado	New Mexico

	Idaho	Utah
	Montana	Wyoming
Region 9: Pacific		
	Alaska	Oregon
	California	Washington
	Hawaii	(11)

Data on the U.S. Associated Areas including American Samoa, Guam, the Marshall Islands, Puerto Rico, and the Virgin Islands is not included.

Having defined the variables and how they are measured, the actual productivity and efficiency measurements are presented in Chapter 4.

REFERENCES

1. Conversation with John L. Ashby, Senior Policy Analyst for the Prospective Payment Commission; Washington, D.C.; September, 1990.

2. Conversation with Robert Pokras, Health Statistician, Hospital Care Statistics Branch, Health Care Financing Administration, Department of Health and Human Services; Hyattsville, Maryland; September, 1990.

3. Fetter, Robert B., "Diagnostic Related Groups: Understanding Hospital Performance," [to be published] Interfaces, January, 1991.

4. Ashby, John L., and Altman, Stuart, H., "The Trend in Hospital Output and Labor Productivity, 1980-1988," [to be published] Health Affairs. (publication date has not yet been determined).

5. Amacher, Ryan C. and Ulbrich, Holley H., Principles of Macroeconomics, 3rd ed. South-Western Publishing Co.; Cincinnati, Ohio: 1986, p. 515.

6. _____, "Productivity Data," Monthly Labor Review, August, 1990

7. Levitt, Theodore, "Product Line Approach to Services," Harvard Business Review, Vol. 50, No. 5; Sept-Oct, 1972; pp.: 41-52.

8. Pokras, R., Kozak, R.J., McCarthy, E., Graves, E.J., Trends in Hospital Utilization: United States, 1965-1986. National Center for Health Statistics. Vital Health Statistics, Vol. 13, No. 101; Sept. 1989.

9. _____, Statistical Abstracts of the United States, 1985-1990, 105th-110th eds. U.S. Department of Congress, Bureau of the Census, Washington, D.C.: 1985-1990.

10. Please see the literature listed in the Bibliography.

11. _____, Hospital Statistics, 1990 ed. The American Hospital Association; Chicago, Illinois: 1990

12. Cromwell, J. and Puskin, D., "Hospital Productivity and Intensity Trends: 1980-1987," Inquiry. Fall, 1989; pp.: 366-380.

13. Bureau of Labor Statistics, Industry Wage Survey: Hospitals, August, 1985, Bulletin 2273. Washington, D.C.; U.S. Department of Labor, February, 1987; pp.: 124-165.

14. Amacher, Ryan C. and Ulbrich, Holley H., Principles of Microeconomics, 3rd ed. South-Western Publishing Co.; Cincinnati, Ohio: 1986

15. Lave, Judith R., "The Effect of the Medicare Prospective Payment System," Annual Review of Public Health, Vol. 10; pp.: 141-161, 1989.

16. Russell, Louise B., Medicare's New Hospital Payment System, Is It Working? The Brookings Institute, Washington, D.C.: 1989.

CHAPTER FOUR: MEASURING HOSPITAL PRODUCTIVITY 1965 THROUGH 1988

Introduction

Almost every industry is interested in maintaining an efficient balance between material and personnel in order to maintain as high a level of productivity as possible. (A possible exception here may be government where efficiency and productivity are often talked about but gross examples of neither are often reported). For-profit industries desire high levels of productivity in order to keep costs at a minimum. This allows them to pay high dividends which retains their current stockholders and attracts new investors. Non-profit industries also desire a high level of productivity so that their bottom line can be written in black instead of red ink. Profits earned are returned to the organization so that it may up-date technology, expand operations, make major improvements, etc. For either industry, profit or non-profit, continually operating in the red means extreme vulnerability and eventually disaster.

As stated earlier, under the retrospective payment system, hospitals had little, if any, incentive to be efficient or productive because they were reimbursed whatever it cost them to maintain operations. For example, if it cost a hospital $100 million to operate in a given year and its patient mix was 60% Blue Cross, 15% Medicare, 15% Medicaid, and 10% other insurance carriers and cash paying patients, then Blue Cross reimbursed the hospital $60 million, Medicare reimbursed $15 million, Medicaid reimbursed $15 million, and the other insurance carriers as well as the cash paying patients paid stated charges - which

would be in excess of $10 million. Capital expenditures such as major equipment purchases, building renovation, plant expansion, etc., were virtually "walk-throughs" that Blue Cross, Medicare, and Medicaid paid for over a given time period depending on the expense involved. Thus, productivity was not an issue that hospitals were concerned about.

With the development of Diagnostic Related Groups (DRGs), the Prospective Payment System (PPS) began reimbursing hospitals a fixed dollar amount for each diagnosis treated. Suddenly, hospitals found themselves thrust into the arena where costs, efficiency, and productivity were paramount issues. These two major patient groups, Medicare and Medicaid, represented a significant amount of most hospitals' income. (Blue Cross followed Medicare and Medicaid with DRG reimbursement in 1989). Hospitals were now faced with a challenge -- exercise cost containment, become efficient, and learn how to be productive or go out of business. (Many hospitals did go out of business as the number of hospitals decreased from a high of 5,979 in 1975 to 5,579 in 1988. In 1984, the first full year of DRG reimbursement, there were 5,814 short-term general and special care hospitals).[1]

Discussion

Short-term general and special care hospitals began to take a serious look at their operations. They have begun to face the challenge of the future and, like any rational industry or individual faced with a potentially serious reduction in income, they began to search for ways that would maximize the return on their investment.

First on the agenda was to curtail non-acute admissions. The Prospective Payment System would not reimburse hospitals for patients who were admitted with a disorder or an illness that could be treated in a non-acute setting such as a physician's office or a clinic. Table 4-1 demonstrates how hospital admissions, which in turn become hospital discharges, declined as hospitals adjusted to comply with the new criteria.

TABLE 4-1 -- U.S. HOSPITAL ADMISSIONS 1965 THRU 1988

Year	Admissions (in 000's)	% Change	Year	Admissions (in 000's)	% Change
1965	26,463	---	1977	34,353	0.8
1966	26,897	1.6	1978	34,575	0.6
1967	26,988	0.3	1979	35,160	1.7
1968	27,276	1.1	1980	36,198	3.0
1969	28,254	3.6	1981	36,494	0.8
1970	29,252	3.5	1982	36,429	-0.2
1971	30,142	3.0	1983	36,201	-0.6
1972	30,777	2.1	1984	35,202	-2.8
1973	31,761	3.2	1985	33,501	-4.8
1974	32,943	3.7	1986	32,410	-3.3
1975	33,519	1.7	1987	31,633	-2.4
1976	34,068	1.6	1988	31,480	-0.5

Source: Hospital Statistics, 1966 thru 1989 eds. The American Hospital Association; Chicago, Illinois: 1966 thru 1989.

Hospital admissions increased steadily until the implementation of the PPS in October of 1983. The slight decrease in 1982 may be, in part, attributable to admission adjustments that the hospital industry began making early in preparation for DRG reimbursement. However, by curtailing non-acute admissions, hospitals did not have resource expenditures for which they would not be reimbursed.

The second item on the agenda was to maximize the profitability of each DRG reimbursement. Decreasing the patients' length of stay (without compromising the quality of care) would allow the hospital to retain more of the DRG payment as profit. (Or, if the hospital was losing money on that DRG, they could reduce their loss). Prior to DRGs and to the extent possible, hospitals often did not discharge a patient until they could function with minimal assistance. After DRGs, hospitals began a greater utilization of home care organizations and short-term extended care facilities (which did not fall under the Prospective Payment System).[2] This resulted in a decrease in the patients' average length of stay as shown in Table 4-2.

TABLE 4-2 -- AVERAGE LENGTH OF STAY (ALOS) IN U.S. HOSPITALS 1965 THRU 1988

Year	ALOS (days)	% Change	Year	ALOS (days)	% Change
1965	7.8	---	1977	7.6	-1.3
1966	7.9	1.3	1978	7.6	0
1967	8.3	5.1	1979	7.6	0
1968	8.4	1.2	1980	7.6	0
1969	8.3	-1.2	1981	7.6	0
1970	8.2	-1.2	1982	7.6	0
1971	8.0	-2.4	1983	7.6	0
1972	7.9	-1.3	1984	7.3	-3.9
1973	7.8	-1.3	1985	7.1	-2.7
1974	7.8	0	1986	7.1	0
1975	7.7	-1.3	1987	7.2	1.4
1976	7.7	0	1988	7.2	0

Source: Hospital Statistics, 1966 thru 1989 eds. The American Hospital Association; Chicago, Illinois: 1966 thru 1989.

The table demonstrates an increase in the average length of stay from 1965 through 1968 and a slight decline in ALOS from 1969 through

1977 with two years (1974 and 1976) with no change. However, with the first year of DRG reimbursement (1984) the average length of stay, which had stabilized at 7.6 days in 1978, immediately decreased in two consecutive years, remained stable in the third year, slightly increased in the fourth year, and stabilized again in the fifth year. The interesting point here is that although the hospitals were admitting patients whose intensity of illness was greater than in the years prior to DRGs, the average length of stay has decreased as hospitals shifted costs that they previously would have had to other health care organizations.[2,3] Thus, they were able to maximize the profitability of the DRG payment.

The third item on the hospitals' agenda was to look at ways to curtail costs. Being a relatively labor intensive industry (approximately 60% of the hospital industry's budget is for personnel)[1,2] hospitals began to scrutinize their personnel needs. Under the retrospective payment system, hospitals had no real constraint from adding personnel to their staffs because employees wages were automatically reimbursed as a cost for providing patient care. Now the question was: how many employees (R.N.'s, X-ray technicians, laboratory technicians, aides, L.P.N.'s, dietary personnel, etc.) did they really need to get the job done? Obviously, any savings the hospitals could realize by limiting the number of personnel they employed would help improve their financial bottom line.

Prior to DRGs, hospital employment was exceptionally steady and the industry rarely experienced overall staff reductions. Employee lay-offs (temporary or permanent) were practically never heard of. However, with the implementation of the Prospective Payment System which resulted in

decreased admissions and declining lengths of stay, hospitals began decreasing personnel they believed were no longer necessary to its functioning through lay-offs and attrition.[2] Initially, this caused some concern that the quality of patient care would decline. But, as discussed in Chapter 3, none of the several studies done since the implementation of the PPS has indicated that patients are receiving lessened quality of care.

Table 4-3 shows how hospitals' full-time equivalents (FTEs) have changed from 1965 through 1988.

TABLE 4-3 -- U.S. HOSPITAL FULL-TIME EQUIVALENTS (FTE) 1965 THRU 1988

Year	FTEs (000s)	% Change	Year	FTEs (000s)	% Change
1965	1,386	---	1977	2,581	3.9
1966	1,532	10.5	1978	2,662	3.1
1967	1,619	5.7	1979	2,762	3.8
1968	1,717	6.1	1980	2,879	4.2
1969	1,824	6.2	1981	3,039	5.6
1970	1,929	5.8	1982	3,110	2.3
1971	1,999	3.6	1983	3,102	-0.3
1972	2,056	2.9	1984	3,023	-2.5
1973	2,149	4.5	1985	3,003	-0.7
1974	2,289	6.5	1986	3,032	1.0
1975	2,399	4.8	1987	3,120	2.9
1976	2,483	3.5	1988	3,209	2.9

Source: Hospital Statistics, 1966 thru 1989 eds. The American Hospital Association; Chicago, Illinois: 1966 thru 1989.

The table indicates a moderate increase in hospital full-time equivalents right up till 1983. Hospitals were, of course, knowledgeable about the introduction of DRG reimbursement for several months prior to the implementation of the PPS on October 1, 1983. It appears reasonable to assume that they spent much of 1983 determining

how DRG reimbursement would affect their bottom line and reduced their full-time equivalents as October drew near. Noticeable increases in full-time equivalents occurred in the last three years. Reasons for these increases and their effect on hospital productivity will be explored shortly.

Hospitals' agendas included many additional items that they hoped would make them profitable and allow them to survive. Endeavors included affiliations in order to consolidate such activities as payroll, purchasing, billing, etc., complete mergers, and purchasing or beginning profitable enterprises such as home health care companies, external laboratories, and extended care facilities. Individual hospitals also opened psychiatric and rehabilitation units within the hospital because, if approved, these units still reimbursed costs and could help the hospital remain financially viable.[2]

The curtailment of non-acute admissions and the decline in the average length of stay have been emphasized because they have a direct relationship to the hospitals' need for personnel which represents the hospitals' largest single expenditure. The number of full-time equivalent personnel employed by hospitals also has a direct relationship on the industry's productivity - which is discussed next.

Aggregate Hospital Productivity

Productivity was defined in Chapter 3 as output per worked hour. Having defined the hospital industry's output as the discharged patient and substituting full-time equivalents for worked hours, the productivity of hospital employees can be determined by dividing the yearly discharges by the number of FTEs employed that year. Table 4-4

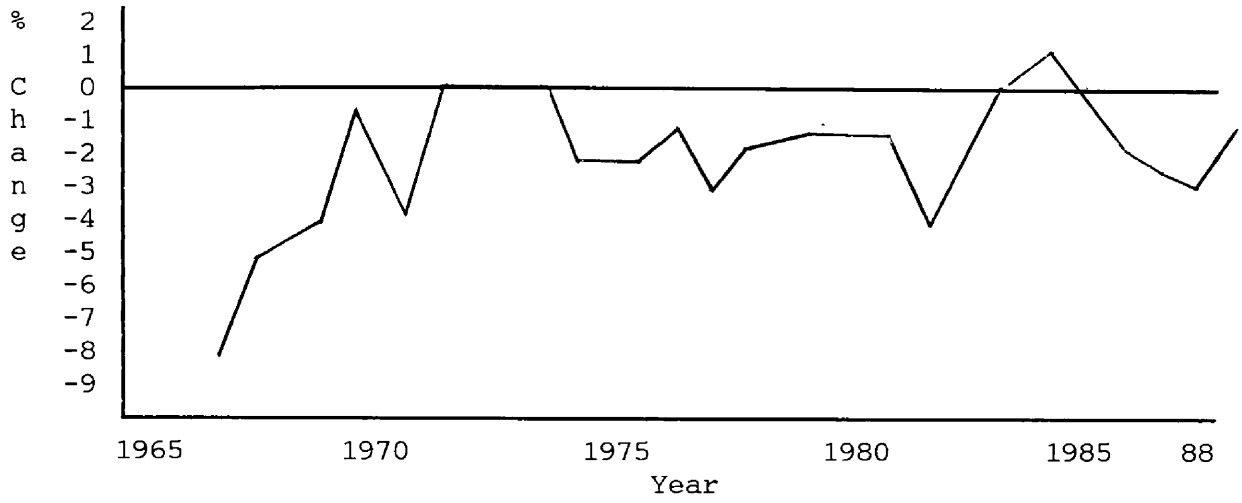
indicates how hospital productivity has changed from 1965 trough 1988 and Figure 4-1 is a graphic representation of the yearly percentage change in productivity.

TABLE 4-4 -- U.S. HOSPITAL PRODUCTIVITY 1965 THRU 1988

Year	Discharges* (000s)	FTEs (000s)	Productivity (discharge/FTE)	% Change
1965	29,142	1,386	21.0	---
1966	29,596	1,532	19.3	-8.1
1967	29,590	1,619	18.3	-5.2
1968	30,090	1,717	17.5	-4.4
1969	30,815	1,824	17.4	-0.6
1970	32,124	1,929	16.7	-4.0
1971	33,360	1,999	16.7	0
1972	34,253	2,056	16.7	0
1973	35,819	2,149	16.7	0
1974	37,266	2,289	16.3	-2.4
1975	38,159	2,399	15.9	-2.5
1976	38,880	2,483	15.7	-1.3
1977	39,288	2,581	15.2	-3.2
1978	39,617	2,662	14.9	-2.0
1979	40,562	2,762	14.7	-1.3
1980	41,666	2,879	14.5	-1.4
1981	41,844	3,039	13.8	-4.8
1982	42,111	3,110	13.5	-2.2
1983	41,945	3,102	13.5	0
1984	41,261	3,023	13.6	0.7
1985	40,201	3,003	13.4	-1.5
1986	39,755	3,032	13.1	-2.2
1987	39,541	3,120	12.7	-3.1
1988	40,236	3,209	12.5	-1.6

*Includes the AHA's formulary adjustment to outpatient visits so that they can be equated with in-patient stays[1]

FIGURE 4-1 -- CUMULATIVE CHANGE IN U.S. HOSPITAL PRODUCTIVITY 1965 THRU 1988



At an initial glance, Table 4-4 and Figure 4-1 indicate that hospital productivity, with few exceptions, has been continually declining from a high of 21.0 discharges per FTE in 1965 to a low of 12.5 in 1988. 1970 through 1973 as well as 1982-83 posted neither an increase nor a decrease in hospital productivity. 1984, the first full year of DRG reimbursement, is the only year to register a gain in productivity. In addition, Figure 4-1 seems to indicate that the rate of change in hospital productivity has fluctuated somewhat erratically. Finally, the hospital industry has been increasing its full-time equivalents despite a declining number of discharged patients (except for a 1.8% increase in discharges in 1988) and stable or decreasing lengths of stay (except for a 1.4% increase in 1987 as seen in Table 4-2).

There are a few historical events that took place during these years that may help put things in perspective. First, the Social Security Act of 1966 included Medicare which provided hospitalization insurance for millions of Americans who previously had had none. For

the next four years hospitals did not increase their staffing as fast as they were experiencing an increase in their patient load. Thus, there was a noticeable decreasing rate in productivity losses.[4]

Second, President Nixon's Economic Stabilization Policy was in effect from early 1971 through mid 1974. Wages and prices were temporarily frozen which was followed by a strong plea for voluntary constraint. Hospital productivity remained unchanged during this period. Why this occurred has not been discernible.[4,5,]

Third, the first full year of DRG reimbursement was 1984 and that is the only year that has shown an increase in hospital productivity. The prior year's productivity remained unchanged as hospitals prepared to meet the financial restraints imposed by the Prospective Payment System. The following three years had increasing losses in productivity while the fourth year had a decrease in the rate of productivity loss. Since the implementation of DRGs, the hospitals appear to have been able to keep the losses in productivity more tightly clustered (as seen in Figure 4-1). However, DRGs were supposed to provide hospitals with an incentive to become more productive. Has this incentive failed?

At issue here is whether the aggregate data are sensitive enough to account for the changing acuity of care needs with which patients present themselves to hospitals. No one disputes that the intensity of patient care has increased since PPS and DRGs changed how hospitals were reimbursed and that the level of intensity has fluctuated from year to year.[4,5,6,] Because hospitals are no longer reimbursed for non-acute patient care, physicians and clinics have been treating non-acute patients in non-hospital settings. Therefore, the patients that physicians do refer to the hospital for treatment are collectively more

critically ill than in prior years and this in turn requires a larger expenditure of medical resources per patient.[4,5,6,] Hospitals and hospital associations have been unable to come to an agreement with the Prospective Payment System or the Health Care Financing Administration on how to account for the increased intensity of care. Hospitals believe that their personal experience in providing patient care indicates an intensity of care level that is greater than the DRG reimbursement allows.[4] The issue remains unresolved.

A second problem with the aggregate data is the American Hospital Association's formula that incorporates outpatient visits into an equivalent in-patient stay. The formula is arbitrary and prior to 1983 counted every three outpatients as an equivalent in-patient. In 1983 it was changed to dividing total outpatient costs by the average cost of all in-patients and adding the quotient to the year's inpatient discharges. In other words, it is currently an attempt to equilibrate outpatient visits to an in-patient stay through the expenditure of dollars. It is questionable that either formula accurately measures medical resource utilization by outpatients that makes it equivalent to in-patient's usage. Therefore, total discharges becomes an arbitrary figure as opposed to an accurate measurement. Obviously, any increase or decrease in total discharges effects productivity positively or negatively. A more sensitive indicator for outpatient visits is certainly needed.

What is clear, however, is that a discharged patient under the Prospective Payment System does use more medical resources (including personnel) than did a patient prior to PPS. In other words, the utilization of discharges (as currently used) to compare productivity

between the retrospective payment system with the PPS is not exactly comparing apples to apples. The use of any acuity index would cause the hospital industry's productivity to respond more favorably to DRG reimbursement. However, neither an accurate nor acceptable acuity index has been developed.[4] Additionally, any change in the methodology of equilibrating outpatients to in-patients would cause productivity to increase or decrease.[4] These problems with the aggregate data are undoubtedly due in part to the "newness" of the PPS and the limited time frame that the industry has had to make adjustments. Nonetheless, assuming that an acuity index would cause the hospital industry's productivity losses to be at a rate less than shown in Table 4-4 and Figure 4-1 (and possibly could be positive) since DRG reimbursement, it appears to be reasonable to assume that hospital productivity has actually responded somewhat favorably to the PPS. Correcting outpatient visits to accurately equilibrate with in-patient stays will also affect productivity but it is uncertain what this affect would be. Therefore, an accurate measurement of the hospital industry's productivity response to DRG reimbursement is currently undeterminable. It is anticipated that the data will become more reliable as the Prospective Payment System refines its policies and procedures. This is not meant to indicate, however, that the hospital industry should discontinue its search for processes that would improve its productivity.

Aggregate Hospital Efficiency

Efficiency, although often used in conjunction with productivity, is, as defined in Chapter 3, the least cost method of producing a product. The hospital industry's product has already been defined as

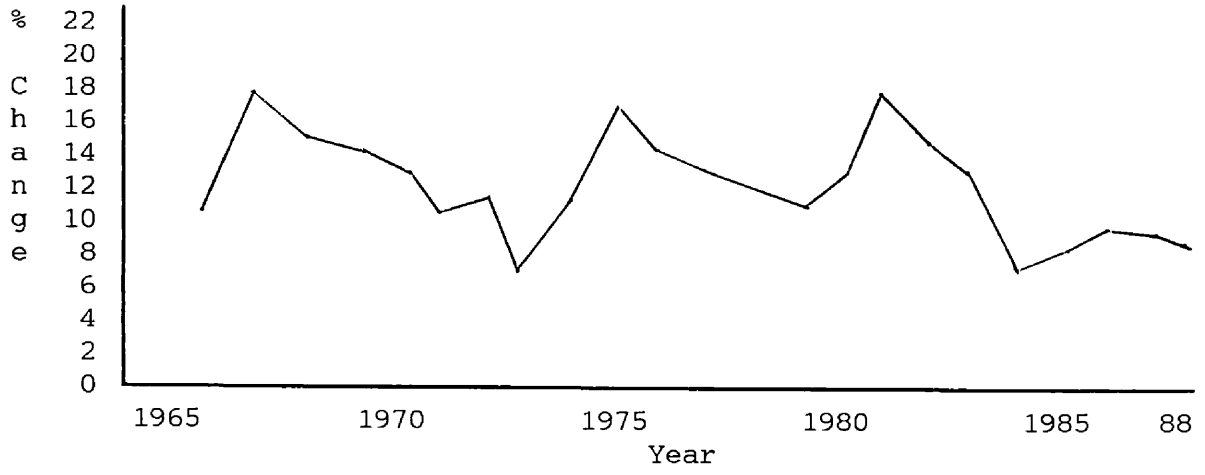
the discharged patient. Dividing the hospital industry's total yearly expenses by the yearly discharges will provide cost per discharge. Comparing the yearly cost per discharge and the yearly rates of change will determine if the hospital industry has become more efficient as a result of the implementation of the Prospective Payment System.

Table 4-5 shows how hospital efficiency has changed from 1965 through 1988 and Figure 4-2 graphically illustrates the yearly percentage of change in efficiency.

TABLE 4-5 -- U.S. HOSPITAL COST PER DISCHARGE 1965 THRU 1988

Year	Discharges (000s)	Total Hospital Expenditures (in mils)	Cost/Discharge	% Change
1965	29,142	$ 9,147	$ 313.88	---
1966	29,596	10,276	347.21	10.6
1967	29,590	12,081	408.88	17.6
1968	30,090	14,162	470.65	15.3
1969	30,815	16,613	539.12	14.5
1970	32,124	19,560	608.70	12.9
1971	33,360	22,400	671.46	10.3
1972	34,253	25,549	745.89	11.1
1973	35,819	28,496	795.56	6.7
1974	37,266	32,751	878.84	10.5
1975	38,159	39,110	1,024.92	16.6
1976	38,880	45,402	1,167.75	13.9
1977	39,288	51,832	1,319.28	13.0
1978	39,617	58,348	1,472.80	11.6
1979	40,562	66,184	1,631.67	10.8
1980	41,666	76,970	1,847.31	13.2
1981	41,844	90,739	2,168.51	17.4
1982	42,111	105,094	2,495.64	15.1
1983	41,945	116,632	2,780.59	11.4
1984	41,261	123,550	2,994.35	7.7
1985	40,201	130,700	3,251.16	8.6
1986	39,755	140,907	3,544.38	9.3
1987	39,541	152,909	3,867.10	9.1
1988	40,236	168,941	4,198.75	8.5

FIGURE 4-2 -- CUMULATIVE CHANGE IN U.S. HOSPITAL COST PER DISCHARGE 1965 THRU 1988



Both Table 4-5 and Figure 4-2 show that they yearly costs per discharge have fluctuated dramatically over the years. Prior to DRG reimbursement there was no incentive to contain costs. As a result, costs fluctuated wildly and were frequently 2, 3, and close to 4 times the Consumer Price Index.[7] Since the implementation of the Prospective Payment System, however, there has been a noticeable change. The first full year of DRG reimbursement saw only single digit increases in the cost per discharge as it increased only 7.7% over 1983. Each of the next two years has less than a 1% increase over the prior year and continued to remain in single digits. The last two years have had a slight decrease.

The same historical events that effected productivity have effected the efficiency measurement of cost per discharge. With the passage of Medicare, the demand for hospital services increased resulting in high rates of increase in the cost per discharge from 1966 through 1970. The Economic Stabilization Policy held the yearly increases relatively stable. When the controls were lifted in 1974 the rate of increase varied dramatically until 1984 and the implementation of the Prospective

Payment System. Figure 4-2 demonstrates that the cost per discharge has been more tightly clustered during DRG reimbursement than at any other time since 1965.

Additionally, the data suffer from the same difficulties discussed regarding hospital productivity. Total discharges do not reflect the increase in the intensity of care provided and are subject to an arbitrary outpatient formula that attempts to equilibrate these visit to an in-patient stay.[4]

Again, any accounting for the increase in patient acuity would cause the cost per discharge to increase at a lesser rate than Table 4-5 shows. However, it is uncertain what an accurate equilibration of outpatient visits to in-patient stays would do to the cost per discharge. It is probable that any adjustment in the outpatient formula could cause an increase or decrease in efficiency.[4]

It appears reasonable to assume from Figure 4-2 and the tighter cluster of points since DRG reimbursement, that the hospital industry has become somewhat more efficient since the implementation of the PPS. Unfortunately, an exact change in efficiency in not determinable from the data that is currently available.[5,6,]

Is it possible to glean any insight into the hospital industry's productivity and efficiency levels from the available data even though it is "insensitive" to some of the changes that have ocurred? Chapter 5 discusses some conclusions.

REFERENCES

1. _____, Hospital Statistics, 1966 thru 1989 eds. The American Hospital Association; Chicago, Illinois: 1966 thru 1989.

2. Felstein, Paul J., Health Care Economics. John Wiley & Sons, New York: 1988.

3. Fetter, Robert B., "Diagnostic Related Groups: Understanding Hospital Performance," [to be published] Interfaces, January, 1991.

4. Conversation with Gerald C. Selke, Chairman, American Osteopathic Hospital Association; Flint, Michigan; November, 1990.

5. Conversation with John L. Ashby, Senior Policy Analyst for the Prospective Payment Comminssion; Whaington, D.C.; September, 1990.

6. Conversation with Robert Pokras, Health Statistician, Health Care Statistics Branch, Health Care Financing Administration, Department of Helath and Human Services, Hyattsville, Maryland; September, 1990.

7. _____, Statistical Abstract of the United States, 1985 & 1990, 105th and 110th eds. U.S. Department of Commerce, Bureau of the Census, Washington, D.C.: 1985 and 1990.

CHAPTER FIVE: CONCLUSIONS

It is apparent from the data presented that the retrospective payment system could not continue operating in an unrestrained capacity. The system provided the hospital industry with no cost constraints. What motivation is there for any industry or individual to contain costs when whatever they spend is automatically reimbursed? To draw an analogy, if every citizen in the United States was reimbursed by the government for their monthly housing expenses, the majority of us would undoubtedly have housing expenses that would exceed our current monthly costs. There would be nothing restraining us from continually moving into more luxurious homes with more and more amenities as they became available. As the government's outlay for monthly housing expenses became increasingly greater, grew far more rapidly than overall inflation, and became unmanageable, the government would begin to cry for cost containment. The citizens, fearing there may be a limiting of monthly housing reimbursement, would limit an amenity here or there and reduce the hours of the gardener, housekeeper, maid, and other household help believing they were doing their part to cut down on costs not realizing that as they continued to "keep up with the Joneses" monthly housing expenses would continue to increase. Eventually, the government would cry "uncle" and have a Prospective Payment System for Housing limiting the construction of new homes and forcing home owners to contain costs on amenities and household help.

The scenario presented in this analogy demonstrates that in the absence of the economic forces of supply and demand price does not

function as an incentive to equate marginal benefits with marginal costs. Thus, the apparent need for some external constraints to prevent a cost reimbursed commodity from becoming overwhelmingly and prohibitively expensive is demonstrated. The Prospective Payment System with DRG reimbursement, implemented in 1983, has attempted to do this with the hospital industry.

Unfortunately, it is not possible to accurately determine the changes that have occurred regarding productivity and efficiency within the hospital industry as a result of the PPS because the available data lacks certain characteristics to do so. These characteristics include the acuity of patient care and equating outpatient visits to in-patient stays. The hospitals' product, discharges, has undergone an increase in the level of acuity that no one disputes but on which the is also no general agreement. Additionally, the methodology of counting outpatient visits to equate to an in-patient stay is arbitrary and no one really knows for certain that it does what it is designed to do. Therefore, very little can be determined about the effect of the PPS on hospital productivity and efficiency.

Hypothetically, it can be estimated what would have happened to the hospital industry's productivity and efficiency had DRG reimbursement not been implemented. Using linear regression and the years 1979 through 1982 as the base years, it is possible to to determine what 1983's discharges per full-time equivalent and cost per discharge might have been. 1980 through 1983's figures can then be used to estimate 1984 and so forth.

On the next page, Tables 4-4 and 4-5 are partially reproduced for the years in question and Figures 4-1 and 4-2 have also been duplicated.

In the Tables, the columns in bold type indicate the linear regression estimate of what the hospital industry's productivity and efficiency levels as well as what the percentage of change might have been without DRG reimbursement. The red line in both figures is the graphic representation of these estimates.

TABLE 4-4 -- U.S. HOSPITAL PRODUCTIVITY 1965 THRU 1988

Year	Productivity (discharge/FTE)		% Change	
1979	14.7		-1.3	
1980	14.5		-1.4	
1981	13.8		-4.8	
1982	13.5		-2.2	
1983	13.5	**13.0**	0	**-3.7**
1984	13.6	**12.5**	0.7	**-3.8**
1985	13.4	**12.1**	-1.5	**-3.2**
1986	13.1	**11.6**	-2.2	**-4.1**
1987	12.7	**10.9**	-3.1	**-6.0**
1988	12.5	**10.5**	-1.6	**-3.7**

FIGURE 4-1 -- CUMULATIVE CHANGE IN U.S. HOSPITAL PRODUCTIVITY 1965 THRU 1988

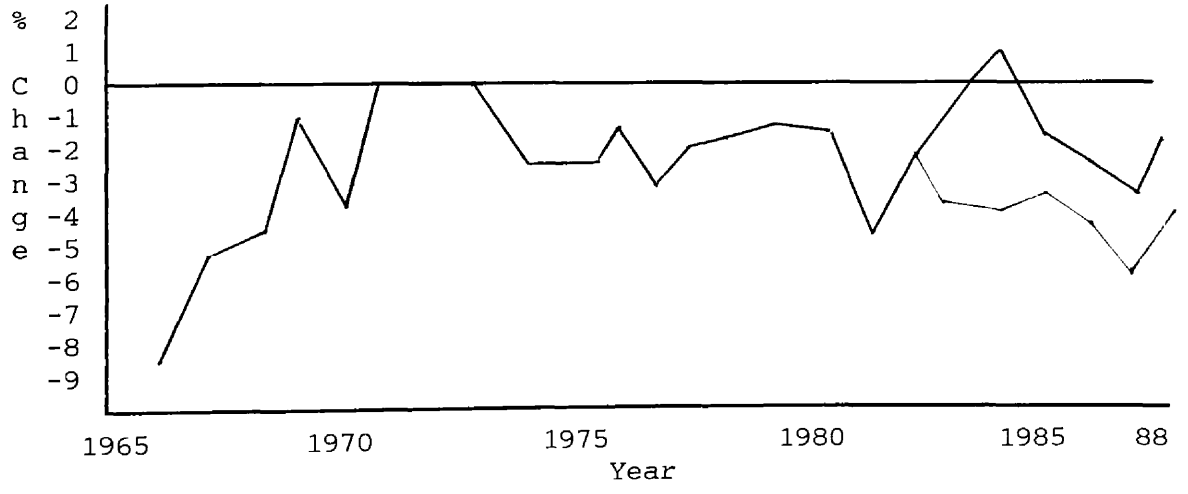
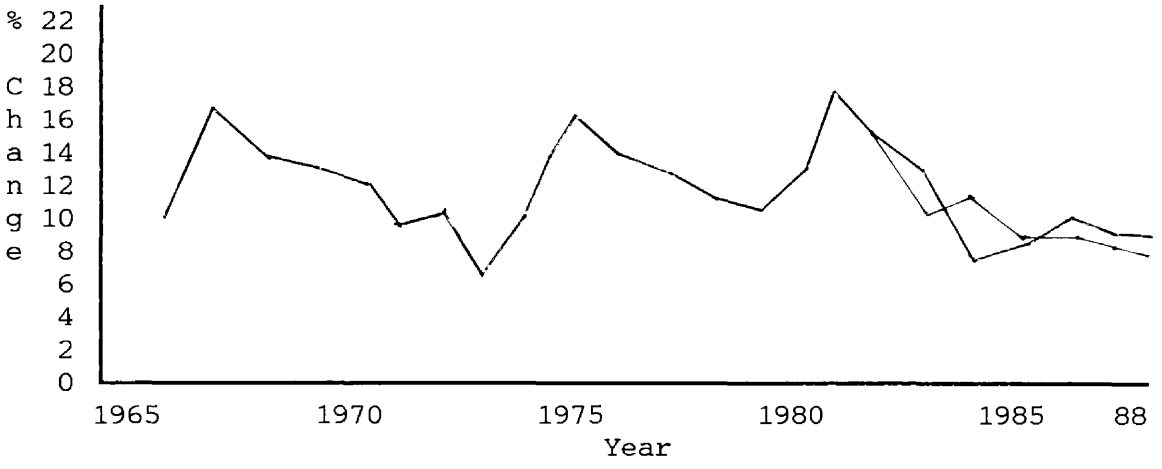


TABLE 4-5 -- U.S. HOSPITAL COST PER DISCHARGE 1965 THRU 1988

Year	Cost/Discharge		% Change	
1979	$1,631.67		10.8	
1980	1,847.31		13.2	
1981	2,168.51		17.4	
1982	2,495.64		15.1	
1983	2,780.59	**$2,764.06**	11.4	**10.8**
1984	2,994.35	**3,088.23**	7.7	**11.7**
1985	3,251.16	**3,386.01**	8.6	**9.6**
1986	3,544.38	**3,682.31**	9.3	**8.8**
1987	3,867.10	**3,993.30**	9.1	**8.5**
1988	4,198.75	**4,290.36**	8.5	**7.4**

FIGURE 4-2 -- CUMULATIVE CHANGE IN U.S. HOSPITAL COST PER DISCHARGE 1965 THRU 1988



From the above tables and graphs, it appears reasonable to assume that hospital productivity would have continued decreasing at an accelerated rate without the Prospective Payment System's intervention. DRG reimbursement appears to have had a positive effect of productivity. The exact extent of this effect, however, is not really known. It also appears that the effect on cost per discharge has been positive although the percentage of change may have been a little less in the latter years without DRG reimbursement. Here again, though, the exact effect can not be accurately determined.

Since its implementation, DRG reimbursement has undergone a number of changes. Originally, there were 467 DRGs. These have been expanded to 490 for Fiscal 1991. Furthermore, adjustments have also been made to the weighted index. As the Prospective Payment System is refined to include a generally accepted accounting of acuity and a verified methodology of equating outpatient visits to an in-patient stay, future studies regarding hospital productivity and efficiency may be able to more accurately assess the impact of DRG reimbursement. Additionally, studies of specific DRGs within a Major Disease Category may provide more efficacious results regarding hospital productivity and/or efficiency.

BIBLIOGRAPHY

Albertson, David, The Fact Book on Prospective Payment. Health Industry Manufactures Association, New York: 1986.

Amacher, Ryan C. and Ulbrich, Holley H., Principles of Macroeconomics, 3rd ed. South-Western Publishing Co.; Cincinnati, Ohio: 1986.

Amacher, Ryan C. and Ulbrich, Holley H., Principles of Microeconomics, 3rd ed. South-Western Publishing Co.; Cincinnati, Ohio: 1986

Anderson, Odin W., The Uneasy Equilibrium; Private and Public Financing of Health Services in the United States, 1875-1965. College and University Press, New Haven: 1968.

Ashby, John L., and Altman, Stuart, H., "The Trend in Hospital Output and Labor Productivity, 1980-1988," [to be published] Health Affairs. (publication date has not yet been determined).

Bainard, Cynthia and Esmond, Truman, Jr., "DRGs - A Progress Report for the Providers Viewpoint," Healthcare Financial Management. January, 1982.

Bureau of Labor Statistics, Industry Wage Survey: Hospitals, August, 1985, Bulletin 2273. Washington, D.C.; U.S. Department of Labor, February, 1987; pp.: 124-165.

Committee on the Costs of Medical care, No. 28, The Final Report of the Committee on the Costs of Medical Care, adopted October 21, 1932. University of Chicago Press, Chicago: 1933.

Corwin, E. A. L., The American Hospital. Commonwealth Fund, New York: 1946.

Cromwell, J. and Puskin, D., Hospital Productivity and Intensity Trends: 1980-1987," Inquiry. Fall, 1989; pp.: 366-380.

Doremus, Harvey D., "A Reimbursement System that Limits the Costs of Hospital Care," Healthcare Financial Management. April, 1983; pp.: 86-91.

English, J., Sharfstein, S., Scherl, D., et al., "Diagnosis-related Groups and General Hospital Psychiatry: the APA Study," American Journal of Psychiatry. 1987; vol. 143; pp.: 131-139.

Enthoven, Alain C., Health Plan: The Only Practical Solution to the Soaring Cost of Medical Care. Addison-Wesley Publishing Co; Reading, Mass.: 1980.

Feldstein, Paul J., Health Care Economics, 3rd ed. John Whiley & Sons, New York: 1988.

Fetter, Robert B. and Freeman, Jean L., "Diagnosis Related Groups: Product Line Management with Hospitals," Academy of Management Review. 1986; vol. 11, No. 1; pp.: 41-54.

Fetter, Robert B., "Diagnostic Related Groups: Understanding Hospital Performance," [to be published] Interfaces, January, 1991.

Goldsberg, Harold L., M.D., Prospective Payment DRGs: New Jersey and the USA," Neurology. August, 1984; pp.: 1073-1076.

Grimaldi, P.L. and Micheletti, J.A., Diagnostic Related Groups, 2nd ed. Pluribus Press Inc., Chicago: 1983.

Levitt, Theodore, "Product Line Approach to Services," Harvard Business Review, Vol. 50, No. 5; Sept-Oct, 1972; pp.: 41-52.

Litman, Theodar J. and Robins, Leonard S., Health Politics and Policy. John Whiley & Sons, Inc., New York: 1984

Marmour, Theodore R. and Marmour Jan S., The Politics of Medicine. Routledge Kegan Paul, London: 1970.

Mason, Robert D., Lind, Douglas A., and Marshal, William G., Statistics An Introduction. Harcourt Brace Jovanovich, Inc., New York: 1983.

Morgan, Lloyd B. and Koppel, Craig A., "An Overview of DRG Regulations - the impact of changing reimbursement patterns," Topics in Health Care Financing. Spring, 1985.

Pokras, R., Kozak, R.J., McCarthy, E., Graves, E.J., Trends in Hospital Utilization: United States, 1965-1986. National Center for Health Statistics. Vital Health Statistics, Vol. 13, No. 101; Sept. 1989.

Rusynko, Barbara, "DRGs, Who, What, How, Where," Today's OR Nurse. April 6, 1984, vol. 4; pp.: 8-13.

Schweiker, Richard S., Secretary, Dept. of Health and Human Services, Report to Congress on Hospital Prospective Payment for Medicare, December, 1982; p: 1.

_____, Annual Survey of Hospitals, 1986, American Hospital Association, 1988. Medicare = 37.9%; Medicaid = 10.9%; Third Party = 32.2%; Self-pay = 8.5%; Other = 10.4%. Flint: Medicare = 34.4%; Medicaid = 13.0%; Third Party = 42.2%; Self-pay = 3.7%; Other = 6.7%.

_____, Hospital Statistics, 1966 thru 1989 eds. The American Hospital Association; Chicago, Illinois: 1966 thru 1989.

_____, Hospital Statistics, 1990 ed. The American Hospital Association; Chicago, Illinois: 1990

_____, "Productivity Data," Monthly Labor Review, August, 1990.

_____, Statistical Abstract of the United States, 1985, 105th ed. U.S. Department of Congress; Bureau of the Census, Washington, D.C.: 1985

_____, Statistical Abstract of the United States, 1989, 109th ed. U.S. Department of Congress; Bureau of the Census, Washington, D.C.: 1989

_____, Statistical Abstracts of the United States, 1985-1990, 105th-110th eds. U.S. Department of Congress, Bureau of the Census, Washington, D.C.: 1985-1990.

_____, The Social Security Act of 1983 (P.L. 98-21). U.S. Government Printing Office; Washington D.C.: 1983 pp. 143-503.

_____, "Table 2, Discharges, average length of stay, days of care, total charges, and program payments for Medicare hospital beneficiaries receiving short-stay hospital inpatient services, by Medicare status of the beneficiary: Calendar years 1972-1983." Health Care Financing Administration; Baltimore, Maryland. Unpublished.

_____, "Rules and Regulations, Federal Register. U.S. Government Printing Office, Washington, D.C.; September 1, 1983; vol. 48; no. 171; pp.: 39768-39777.

_____, Webster's New Collegiate Dictionary. G&C Merrian Co., Springfield, Massachusetts: 1981.

Conversation with John L. Ashby, Senior Policy Analyst for the Prospective Payment Commission; Washington, D.C.; September, 1990.

Conversation with Gerald C. Selke, Chairman, American Osteopathic Hospital Association; Flint, Michigan; November, 1990.

Conversation with Robert Pokras, Health Statistician, Hospital Care Statistics Branch, Health Care Financing Administration, Department of Health and Human Services; Hyattsville, Maryland; September, 1990.